PUBLIC HEALTH REPORTS

VOL. 45 DECEMBER 19, 1930 NO. 51

EXPERIMENTAL STUDIES OF WATER PURIFICATION

V. Prechlorination in Relation to the Efficiency of Water Filtration Processes[1]

By H. W. STREETER, *Sanitary Engineer*, and C. T. WRIGHT, *Technical Assistant in Sanitary Engineering, United States Public Health Service*

During the past few years the chlorination of water as a preliminary stage of filtration treatment, commonly termed "prechlorination," has been attracting considerable attention in this country both as an auxiliary method for reinforcing filtration plants against overburden due to excessive raw water pollution and as a possible means of effecting economies in the use of coagulants. In a review of progress in water chlorination published in 1928, Enslow [2] described the results recently obtained from this method of treatment in 14 North American cities, thus indicating the extent to which it has become established in routine practice during the past few years.

In this connection it may be of interest to note that the use of prechlorination dates back to the original applications made of chlorine in large-scale water disinfection. In 1904 Houston and McGowan who are credited with being the originators of this method of water treatment on a plant scale, added chlorine, in the form of sodium hypochlorite, to the raw water supplying the Lincoln filters, in the London water system. In 1908 Johnson, who was the American pioneer in water chlorination, added chlorine, as calcium hypochlorite, to the raw water of the Bubbly Creek filters at Chicago.

With the rapid and widespread extension of water chlorination which followed the work of these investigators, the practice of adding chlorine to water prior to filtration treatment became supplanted to a large extent, in the United States, by that of postchlorination, or chlorination after filtration, which in ordinary cases proved to be the more economical and readily controlled method. As early as 1914 it was reported by Longley [3] that this latter method was being followed at over half of the plants surveyed by his committee. At the present

[1] Presented at the annual meeting of the American Water Works Association, St. Louis, Mo., June 5, 1930.

[2] Enslow, L. H.: Progress in Chlorination of Water. Jour. Am. Water Wks. Assoc., vol. 20, No. 6 (Dec. 1928), pp. 819-846.

[3] Report of Committee on Water Supplies. Sanitary Engineering Section, American Public Health Association, 1914.

time it has become virtually a universal practice in connection with filtration, regardless of the kind or extent of preliminary treatment used prior to filtration.

The revival of prechlorination as a measure of reinforcement for overburdened filtration plants already equipped with postfilter chlorination, thus introducing double-stage chlorination into current water purification practice, has brought this method quite naturally into comparison with other elaborations of ordinary filtration processes such as double-stage coagulation, sedimentation, or filtration. In view of this development and of the fact that most of the tests of the efficacy of prechlorination quite necessarily have been made by comparison of the performance of individual filtration plants over two different periods, one preceding and the other following the institution of this practice, it appeared that a parallel comparative test, covering a single period, of the results obtained from identical treatment of the same raw water, both with and without prechlorination, might afford a more direct index of the extent of improvement in efficiency accomplished by this measure.

Facilities for making such a test were available at a fully equipped experimental water filtration plant of the rapid sand type installed by the United States Public Health Service at Cincinnati in 1924, primarily for another purpose, [4] but well adapted for controlled parallel observations of the character indicated. The prechlorination experiments were made over a period of 16 months extending from July, 1927, to October, 1928, inclusive. In this paper [5] it is proposed to discuss briefly some of the more significant results of these experiments.

DESCRIPTION OF EXPERIMENTS

The experimental plant, which has been fully described elsewhere,[6] was arranged so that it could be operated in two parallel and duplicate sections, as shown diagramatically in Figure 1. In operating the plant for these experiments, the raw water was divided as it left the head tank, approximately one half of it flowing through one section of the plant and one half through the other section. The water flowing through the two sections was given as nearly as possible the same rapid sand filtration treatment, except that the portion flowing through the section designated as "A" in the chart was prechlorinated at the point indicated, just before passing into the sedimentation basin, but shortly after the addition of the coagulant.[7] As the nominal period of reten-

[4] See Reprints Nos. 1114 and 1170 from the Public Health Reports, issues of Oct. 1, 1926, and July 15, 1927.

[5] The present paper is the fifth of a series dealing with the result of experimental studies of the efficiency of water purification processes conducted at the experimental plant above designated. For the preceding paper of the series see Public Health Reports for July 4 and 11, 1930, pp. 1521–36 and 1597–1623, respectively.

[6] Reprint No. 1114, Public Health Reports (Oct. 1, 1926), pp. 1–9.

[7] It was not practicable to prechlorinate the raw water prior to the addition of the coagulant, though the interval of time between the addition of the coagulant and prechlorination was very little more than one minute.

tion in the basin was 6 hours, this period represented the time of contact of chlorine with the prechlorinated water before it passed to filter A. The effluents of both filters, A and B, were chlorinated as they passed from each filter into a separate well, where the water was stored for a nominal period of about 20 minutes before being discharged into the final effluent pipe.

After the first month, which constituted a trial period, the plant was operated for 12 months (August, 1927, to July, 1928, inclusive) with the residual chlorine content of the prechlorinated water, as applied to the filters, held within an upper limit of 0.05 p.p.m. during the greater part of the time. During the last three months of the test, this residual was increased gradually up to a maximum of 1.2 p.p.m. in order to observe the effect of heavy prechlorination on the efficiency of filtration. Throughout the entire test period an effort was made to adjust the postchlorination dosage so as to leave a final residual chlorine in the effluent of each filter not exceeding 0.05 p.p.m., an amount falling below the ordinary taste-producing minimum. During the period of heavy prechlorination the final residual chlorine exceeded 0.05 p.p.m. on several occasions, but at no time did it average more than 0.10 p.p.m. for a given day. The coagulant dosage was regulated in accordance with the usual practice and a particular effort was made to maintain the same dosage in the prechlorinated and nonprechlorinated water.

In order to maintain a close check on the residual chlorine content of the water at the various stages of treatment, tests were made hourly at each stage throughout the period of the experiments. Samples of water for physical, chemical, and bacteriological examination were collected at each step of treatment, at 8-hour intervals throughout the day and night, with more frequent collections occasionally as required.

RESULTS OF EXPERIMENTS

Period averages.—The results of the experiments have been compiled in a series of tables and illustrative charts, to be presented in connection with the text which follows. In Figures 2 and 3, based on the data given in Table 1, are two block diagrams showing the comparative average numbers of plate-growing bacteria and *B. coli* observed at each stage of treatment, with and without prechlorination, during successive months of the experiment. For convenient reference, the corresponding average amounts of residual chlorine carried in the prechlorinated water after coagulation-sedimentation and in both filter effluents after postchlorination, have been added to the table and plotted in the chart.

TABLE 1.—*Monthly average numbers of bacteria and amounts of residual chlorine observed at various stages of treatment, with and without raw water prechlorination*

A=raw water prechlorinated
B=raw water not prechlorinated

Month	Average bacterial count per c. c., 24 hours, 37° C.							Average B. coli index per 100 c. c.							Average residual Cl, p. p. m.		
	Raw	Applied		Filtered		Postchlorinated		Raw	Applied		Filtered		Postchlorinated		Applied, A	Postchlorinated	
		A	B	A	B	A	B		A	B	A	B	A	B		A	B
1927																	
July	16,700	201	2,960	150	265			28,000	206	7,020	20	212					
August	16,200	518	2,580	166	235			35,000	387	3,710	28	113					
September	37,600	588	10,400	252	646	66	116	52,500	1,100	22,200	50	417	5.2	13	0.06	0.04	0.04
October	17,800	188	6,560	118	313	39	43	49,400	471	8,770	29	251	2.2	10	.07	.05	.02
November	6,960	130	1,230	5.9	32	3.8	8.6	26,500	325	4,240	6.5	18	2.7	3.3	.02	.05	.05
December	6,060	122	389	.8	17.6	.6	3.2	16,100	12	1,190	.5	5.3	0.0	.1	.02	.03	.04
1928																	
January	1,960	78	139	1.5	.8	.5	.4	23,000	70	922	.2	2.7	0.0	.5	.01	.05	.05
February	1,410	77	171	1.4	6.0	.8	.8	12,400	17	1,310	.4	38	.2	.5	.02	.05	.05
March	1,070	61	164	.6	2.2	.4	.5	16,600	64	1,870	2.2	14	.1	.8	.02	.06	.05
April	1,690	63	147	.3	1.6	.03	.07	11,500	44	1,060	.1	5.1	.6	.2	.02	.06	.05
May	1,730	61	414	5.8	21.5	.3	.4	18,700	56	2,800	1.0	55	.6	2.4	.03	.05	.05
June	5,360	95	374	9.7	22.1	1.4	2	28,800	148	3,190	4.2	36	.3	2.1	.02	.04	.04
July	6,870	27	629	24	115	14	15	36,500	39	1,600	.6	130	.6	1.1	.07	.06	.04
August	10,400	1.9	1,310	24	171	15	11	36,000	.3	3,390	3.3	84	2.5	3.7	.36	.06	.05
September	10,600	.5	2,000	9.9	150	8.6	2.4	43,200	.2	8,690	.4	80	1.1	.5	.77	.08	.06
October	18,700	12.2	6,760	3.6	680	4.1	1.9	53,500	1.5	29,500	.2	394	.4	4.4	.33	.08	.06

The table and the charts show a consistent improvement in the bacterial quality of all of the effluents, applied, filtered, and chlorinated, resulting from prechlorination, except in August and September, 1928, when both the plate-growing bacteria and *B. coli* showed an increase in average numbers in the prechlorinated water passing through filter A. As this observed increase occurred only during the period of heavy prechlorination, it can be accounted for only as being due to a marked disturbance in the normal efficiency of filtration resulting from contact of the filter with water containing relatively high amounts of residual chlorine. During the following month, October, the efficiency of this filter was regained, to a considerable extent, in spite of the continued high residual chlorine in the applied

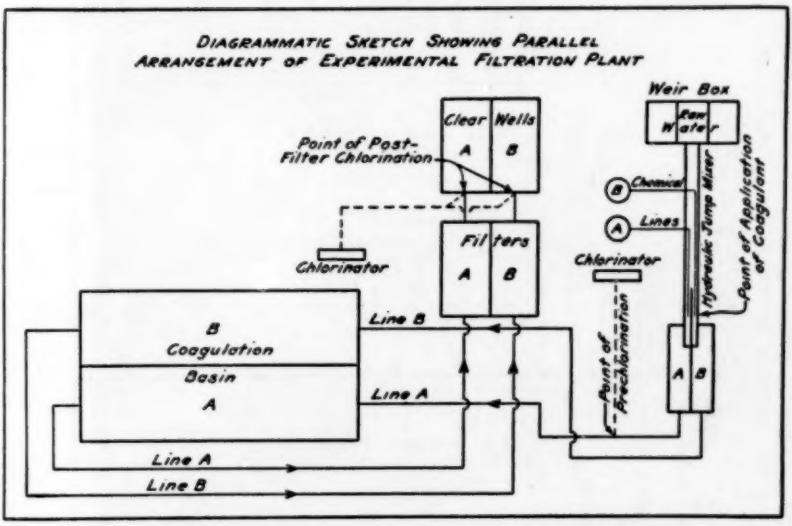

FIGURE 1.—Diagrammatic sketch showing parallel arrangement of experimental filtration plant and points of application of chemicals

water, possibly owing to the adjustment of the filter to a condition of increased tolerance for water of high chlorine content. The behavior of this filter prior to and during the period indicated afforded evidence that the bacterial efficiency of rapid sand filters is intimately associated with biological conditions prevailing in the filtering medium. Particularly significant in this connection was the marked increase in the *B. coli* content of the effluent of filter A during August, the first month of heavy prechlorination, both as compared with the corresponding numbers of this class of organisms observed in the applied water during the same month and as compared with their numbers in the filtered effluent during the preceding month. This increase, if not due to actual multiplication, as seems hardly likely, probably resulted from a progressive "sloughing" of *B. coli* pre-

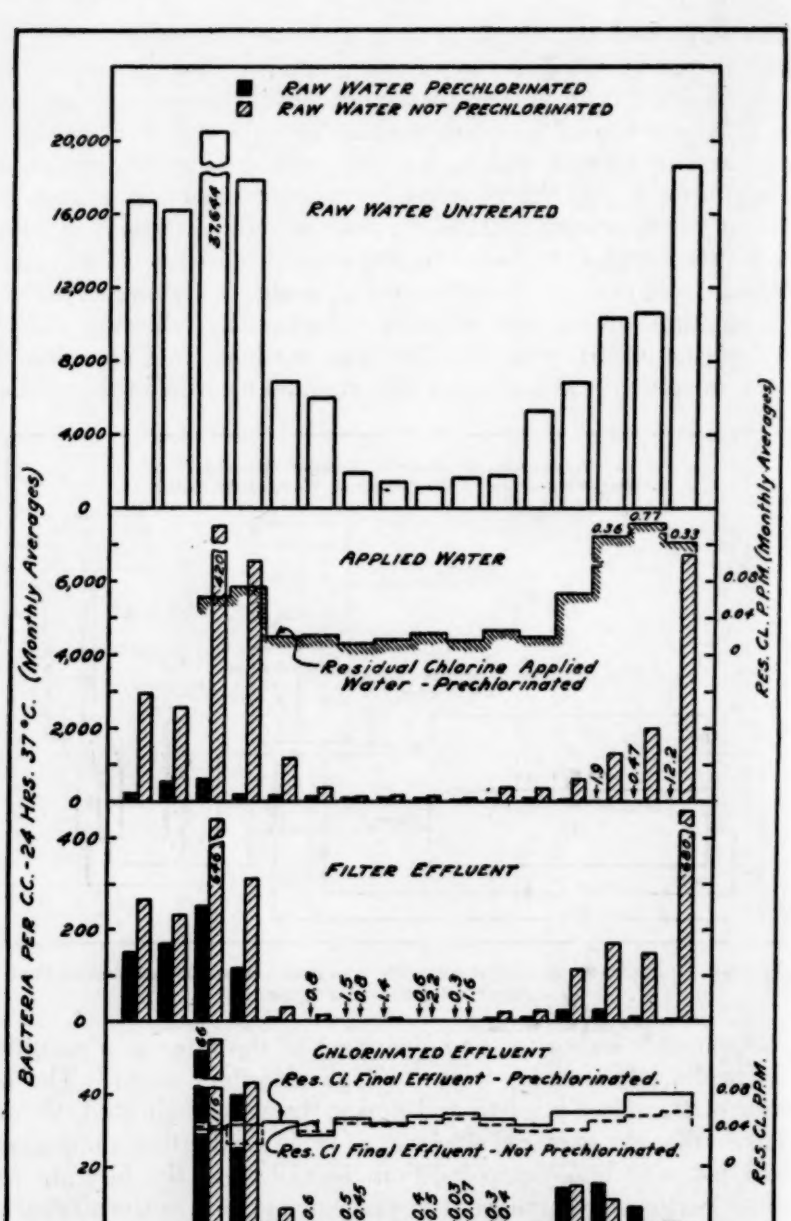

FIGURE 2.—Comparative monthly average bacterial counts, 24 hours at 37° C., observed at successive stages of treatment, with and without prechlorination, during the period of the experiments. (Based on data given in Table No. 1)

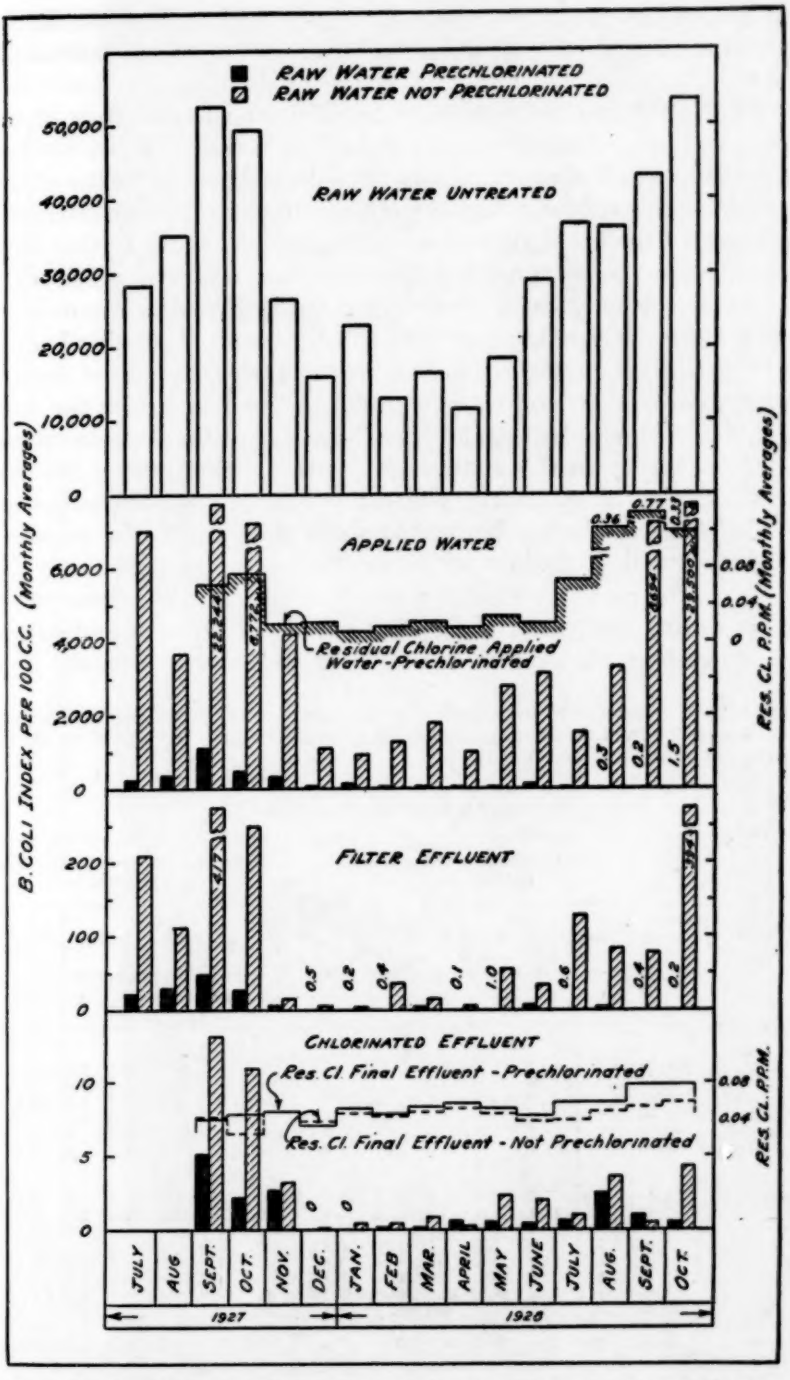

FIGURE 3.—Comparative monthly average *B. coli* indices observed at successive stages of treatment, with and without prechlorination, during the period of the experiments. (Based on data given in Table No. 1)

viously retained in the filter as a consequence of the marked disturbance in the biological flora occurring after heavy prechlorination was instituted.

In order to show the variations in the bacterial efficiency of each separate stage of treatment, from month to month, Table 2 has been prepared in which the percentages of bacteria observed in the effluent of each stage, with and without chlorination, have been referred in each case to the bacterial content of the influent water to that stage. The effect of heavy prechlorination on the bacterial efficiency of coagulation-sedimentation is reflected in the marked decrease observed in the residual percentages of both the 37° C. plate-growing bacteria and the *B. coli* in the applied A water during the three months, August, September, and October, 1928, as compared with the corresponding residuals observed in this effluent during the previous months. It is noteworthy in this connection, however, that during the same three months the efficiency of filtration and of postchlorination was decidedly less in the prechlorinated water than during the months in which the residual chlorine of the applied water was relatively low. It also is to be noted that the bacterial efficiency of filtration was higher during the winter and spring months, both with and without prechlorination, than during the summer and autumn periods.

TABLE 2.—*Percentages of the numbers of bacteria observed in the influent water of each stage of treatment remaining in the effluent of that stage (based on monthly averages given in Table No. 1)*

A=raw water prechlorinated
B=raw water not prechlorinated

Month	Raw water bacterial count 24 hours, 37° C.	Per cent of influent water bacteria remaining in—						Raw water B. coli index per 100 c. c.	Per cent of influent water B. coli remaining in—					
		Applied		Filtered		Postchlorinated			Applied		Filtered		Postchlorinated	
		A	B	A	B	A	B		A	B	A	B	A	B
1927														
July	16,700	1.2	17.7	74.7	9.0	------	------	28,000	0.4	25.1	9.7	3.0	------	------
August	16,200	3.2	15.9	32.1	9.1	------	------	35,000	1.1	10.6	7.2	3.0	------	------
September	37,600	1.6	27.7	42.8	6.2	25.2	18.0	52,500	2.1	42.3	4.5	1.9	10.4	3.1
October	17,800	1.1	36.9	56.0	4.8	33.0	13.7	49,400	1.0	17.8	6.2	2.9	5.6	4.0
November	6,960	1.9	17.7	4.5	2.6	64.4	26.9	26,500	1.2	16.0	2.0	.4	41.6	18.3
December	6,060	2.0	6.4	.7	4.6	75.0	17.8	16,100	.07	7.4	4.2	.4	0.0	1.9
1928														
January	1,960	4.0	7.1	1.9	.6	33.3	50.0	23,000	.3	4.0	.3	.3	0.0	18.5
February	1,410	5.5	12.1	1.8	3.5	57.2	13.3	12,400	.1	10.6	2.4	2.9	50.0	1.3
March	1,070	5.7	15.3	1.0	1.3	66.7	22.8	16,600	.4	10.3	3.4	.8	4.6	5.7
April	1,690	3.7	8.7	.5	1.1	10.0	4.4	11,500	.4	9.2	.2	.5	100+	3.9
May	1,730	3.5	23.9	9.5	5.3	.5	1.8	18,700	.3	15.0	1.8	2.0	60.0	4.4
June	5,360	1.8	7.0	10.2	5.9	14.4	9.1	28,800	.5	11.1	2.8	1.1	7.2	5.9
July	6,870	.4	9.2	88.9	18.3	58.3	13.1	36,500	.1	4.4	1.5	8.1	100+	.8
August	10,400	.02	12.6	100+	13.1	62.5	6.4	36,000	.008	9.4	100+	2.5	75.9	4.4
September	10,600	.005	18.9	100+	7.5	86.9	1.6	48,200	.005	21.0	100+	9.2	100+	.6
October	18,700	.06	36.2	29.5	10.0	100+	.3	53,500	.03	55.2	13.3	1.3	100+	1.1

The comparative average efficiencies of bacterial removal effected up to the end of each stage of treatment, both with and without prechlorination, are shown in Table 3 and Figure 4 by average residual

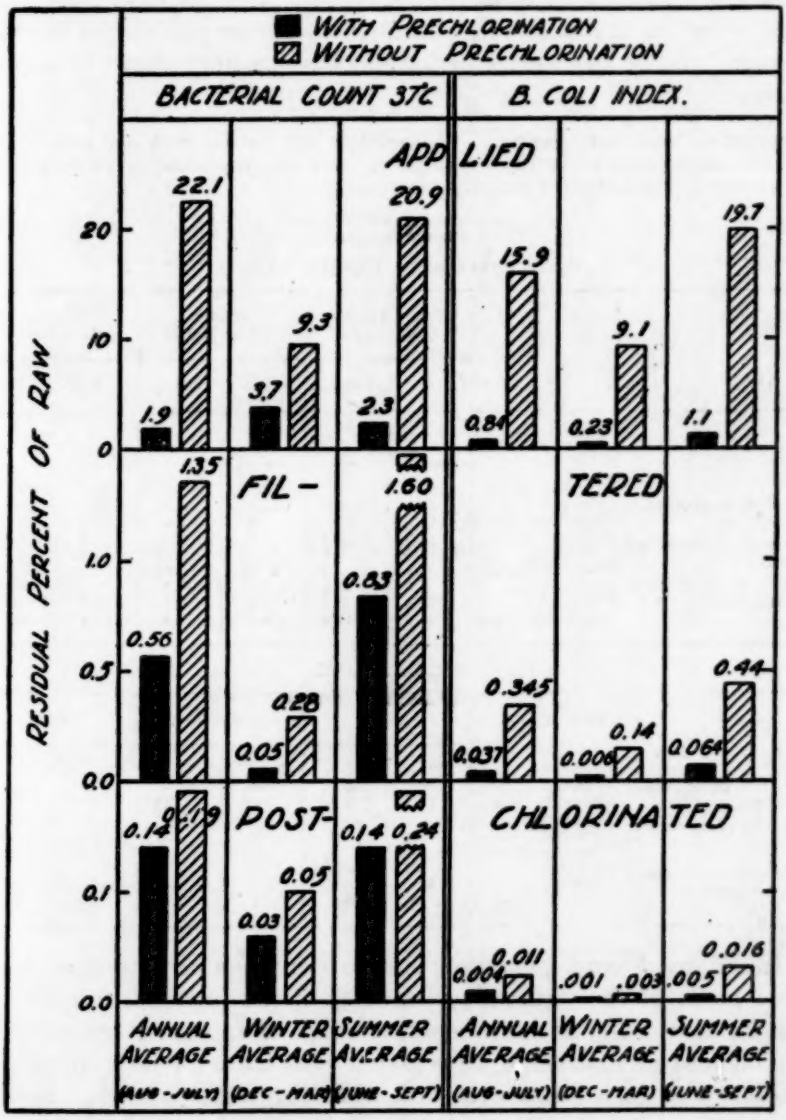

FIGURE 4.—Comparative residual percentages of raw water bacteria observed in effluents of successive stages of treatment, with and without prechlorination, under annual, winter, and summer average conditions. (Based on data given in Table No. 3)

percentages of raw water bacteria observed in the effluent of each stage during three periods—(*a*) from August, 1927, to July, 1928, inclusive, embracing a complete annual cycle; (*b*) from December to

March, the winter period; and (*c*) from June to September, the summer period. In Figure 4 it will be noted that the difference observed between the efficiencies with and without prechlorination was greatest after the first stage of treatment and least after the final stage; also that the efficiency observed during the summer period was slightly less and during the winter period slightly greater, than the annual average.

TABLE 3.—*Comparative averages of bacterial results observed with and without raw water prechlorination, with corresponding residuals, expressed as percentages of raw and of influent water contents, respectively*

(A) = Raw water prechlorinated
(B) = Raw water not prechlorinated

BACTERIAL COUNT, 24 HOURS, 37°C.

		Yearly average (Aug.–July)		Winter (Dec.–Mar.)		Summer (June–Sept.)	
		A	B	A	B	A	B
	Raw	8,730		2,170		14,600	
Per cubic centimeter	Applied	167	1,930	80	202	330	3,050
	Filtered	49	118	1.1	6.1	121	226
	Postchlorinated	12	17	.6	1.1	21	36
Per cent of raw water count.	Applied	1.9	22.1	3.7	9.3	2.3	20.9
	Filtered	.56	1.35	.05	.28	.83	1.6
	Postchlorinated	.14	.19	.03	.05	.14	.24
Per cent of influent water count.	Applied	1.9	22.1	3.7	9.3	2.3	20.9
	Filtered	29.4	6.1	1.4	3.0	36.7	7.4
	Postchlorinated	24.5	14.4	54.5	17.4	25.1	17.2

B. COLI INDEX

	Raw	27,200		15,500		34,500	
Per 100 cubic centimeters.	Applied	228	4,410	36	1,420	372	6,800
	Filtered	10	96	.94	21	22	150
	Postchlorinated	1.1	3.1	.10	.48	1.9	5.8
Per cent of raw water index.	Applied	.84	15.9	.23	9.1	1.1	19.7
	Filtered	.037	.345	.006	.14	.064	.44
	Postchlorinated	.004	.011	.0006	.0031	.0052	.0158
Per cent of influent water index.	Applied	.84	15.9	.23	9.1	1.1	19.7
	Filtered	4.4	2.2	2.6	1.5	5.9	2.2
	Postchlorinated	11.0	3.2	10.4	2.3	9.8	4.1

In Figure 5 corresponding plots covering the same periods have been made of the residual percentages of the bacterial numbers in the influent water of each separate stage of treatment observed in the effluent of that stage, thus giving a measure of the comparative efficiency of each stage with and without prechlorination. In this chart it is noted that the average efficiency of bacterial removal by filtration and by postchlorination, respectively, was consistently less in the prechlorinated water than in that which was not prechlorinated, thus indicating that the very marked effect of prechlorination shown at the primary stage of treatment was offset in part by the diminished efficiency of filtration and postchlorination, in comparison with the efficiency observed at these two stages in the absence of

prechlorination. That this result was due, in part at least, to the effect of prechlorination rather than wholly to the reduced density of bacteria in the prechlorinated water, was indicated as will be

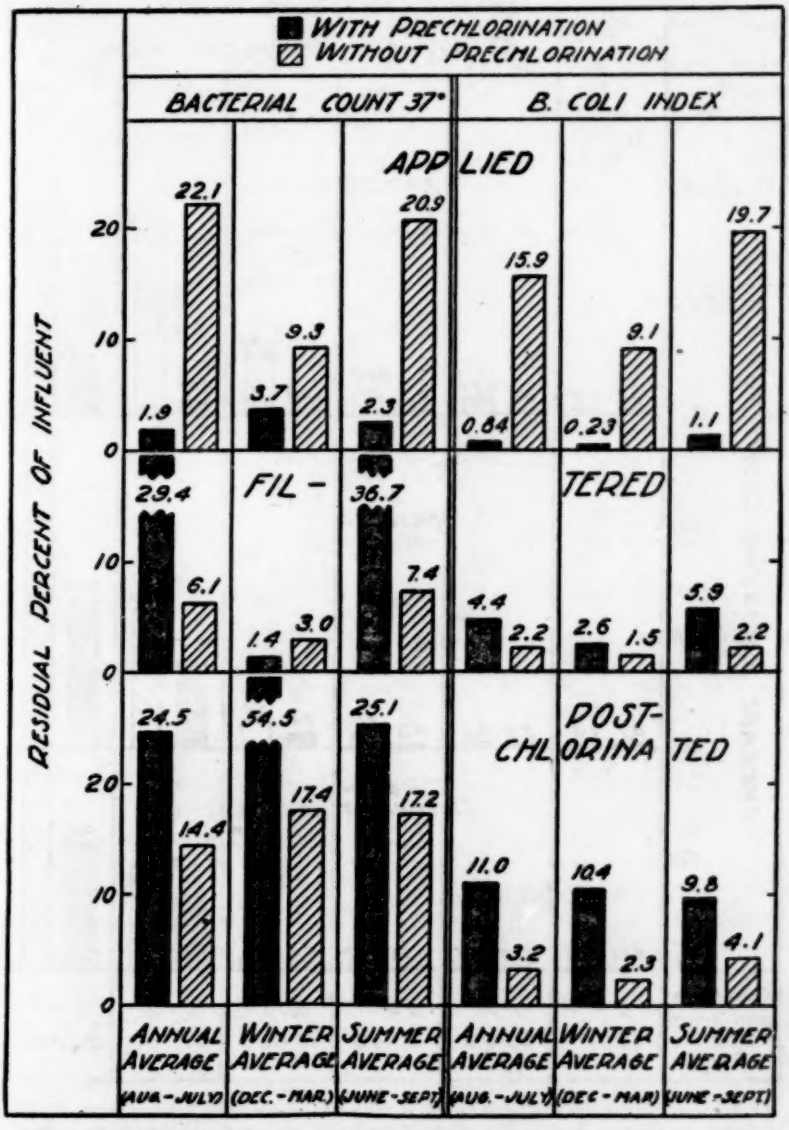

FIGURE 5.—Comparative residual percentages of influent water bacteria observed in effluents of successive stages of treatment, with and without prechlorination, under annual, winter, and summer average conditions. (Based on data given in Table No. 3)

shown at a later point in this text, by the lower efficiency observed at these two stages with approximately the same numbers of bacteria in the influent water.

Effect of prechlorination on relations between quality af raw water and corresponding quality of effluents.—The effect of prechlorination

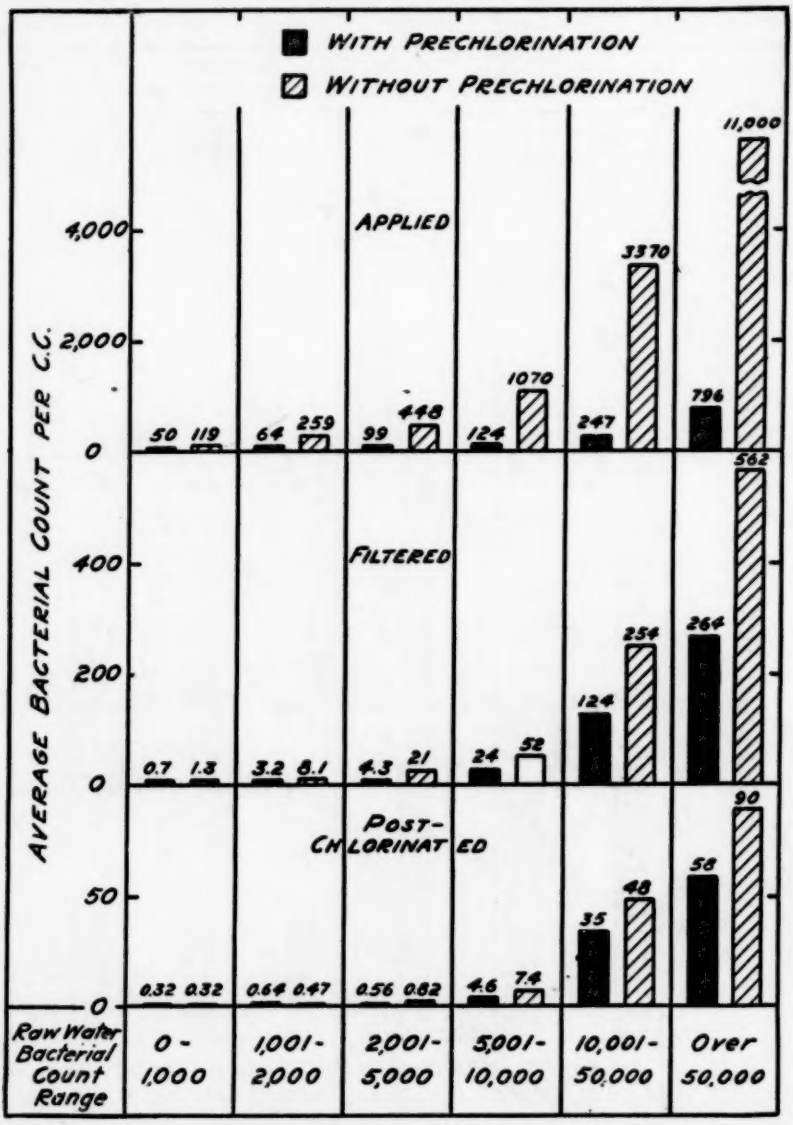

FIGURE 6.—Comparative average numbers of plate-growing bacteria, 24 hours at 37° C., observed in effluents of successive stages of treatment, with and without prechlorination, corresponding to averages of numbers of raw water bacteria falling within various specified ranges. (Based on data given in Table No. 4)

on the relationships observed between the bacterial quality of the raw water and the corresponding quality of the effluents from successive stages of treatment is illustrated in Figures 6 and 7, which have

been plotted from averages as given in Table 4, obtained by grouping the daily results according to the numbers of raw water bacteria

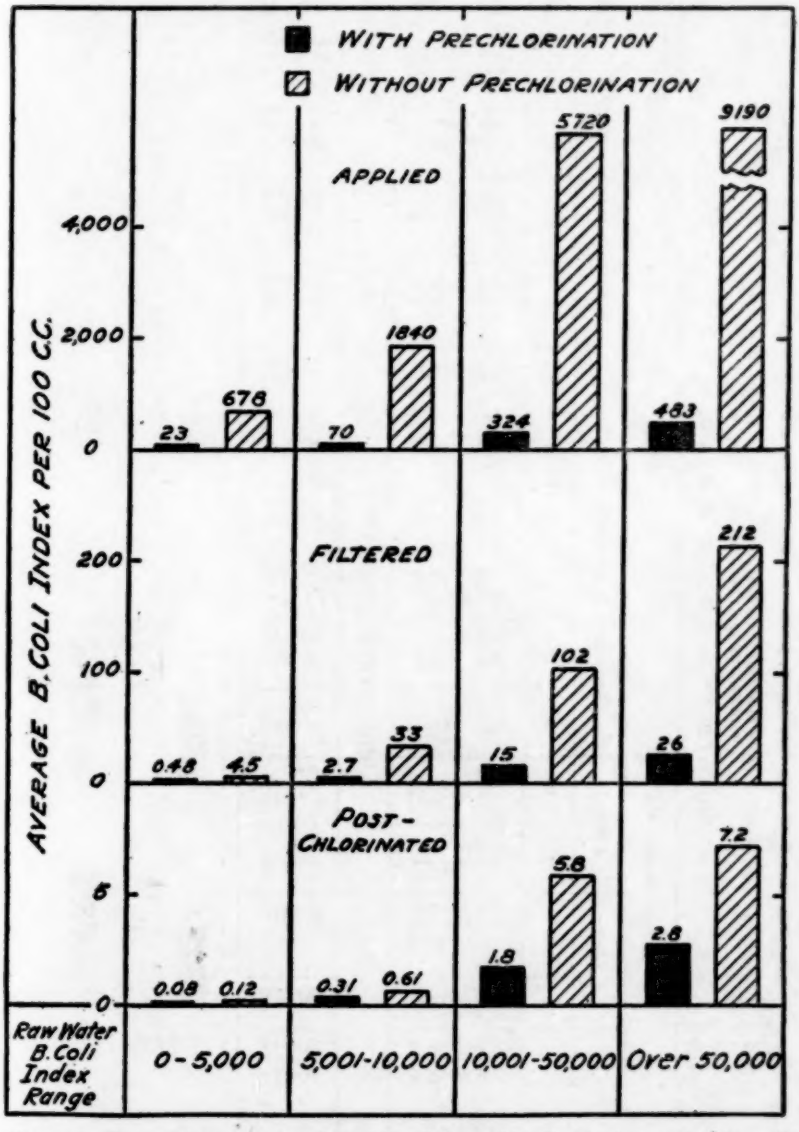

FIGURE 7.—Comparative average numbers of *B. coli* observed in effluents of successive stages of treatment, with and without prechlorination, corresponding to averages of numbers of raw water *B. coli* falling within various specified ranges. (Based on data given in Table No. 4)

falling within various ranges of ascending magnitude and averaging, for each group, the numbers observed simultaneously in the raw water and in the effluent of each stage of treatment.

TABLE 4.—*Relations between average numbers of bacteria observed in raw water and corresponding average numbers observed in effluents from various stages of treatment, with and without prechlorination*

A = raw water prechlorinated
B = raw water not prechlorinated

BACTERIAL COUNT, 24 HOURS, 37° C. (PER C. C.)

Raw water range	Average numbers							Per cent of raw in—						Per cent of influent in—			
	Raw	Applied		Filtered		Postchlorinated		Applied		Filtered		Postchlorinated		Filtered		Postchlorinated	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
0–1,000	708	50	119	0.7	1.3	0.32	0.32	7.1	16.8	0.10	0.18	0.045	0.045	1.4	1.1	45.7	24.6
1,001–2,000	1,440	64	259	3.2	8.1	.64	.47	4.5	18.0	.22	.56	.044	.033	5.0	3.1	20.0	5.8
2,001–5,000	3,190	99	448	4.3	21	.56	.82	3.1	14.0	.14	.66	.018	.026	4.4	4.7	13.0	3.9
5,001–10,000	7,350	124	1,070	24	52	4.6	7.4	1.7	14.6	.32	.71	.065	.104	19.3	4.9	35.1	17.3
10,001–25,000	14,900	247	3,370	124	254	35	48	1.7	22.6	.83	1.70	.253	.350	50.0	7.5	33.1	17.0
Over 25,000	40,800	796	11,000	264	562	58	90	2.0	27.0	.65	1.38	.134	.207	33.2	5.1	26.8	16.1
B. COLI INDEX (PER 100 C. C.)																	
0–5,000	2,280	23	678	0.48	4.5	0.08	0.12	1.1	29.1	0.021	0.198	0.0035	0.0053	1.8	0.7	16.7	2.7
5,001–10,000	8,170	70	1,840	2.7	33.4	.31	.61	.86	22.5	.033	.409	.0038	.0075	3.8	1.8	32.0	2.4
10,001–50,000	33,800	324	5,720	15	102	1.8	5.8	.96	16.9	.044	.302	.0053	.0172	4.7	1.8	10.2	6.5
Over 50,000	64,300	483	9,190	26	212	2.8	7.2	.75	14.3	.040	.330	.0044	.0112	5.4	2.3	17.9	3.6

In these charts it will be noted that in both the prechlorinated and nonprechlorinated waters a consistent increase in bacterial content was shown to occur in the effluent of each stage of treatment coincidently with an increase in the numbers of raw water bacteria, though the proportionate extent of increase was measurably less in the prechlorinated water than in that which was not prechlorinated.

When the same group averages were plotted against the corresponding raw water averages on logarithmic scales, a series of plots was obtained such as are shown in Figure 8, which is based on the *B. coli* group averages given in Table 4 and shown in block diagram in Figure 7. In Figure 8 the plots designated as "A" refer to the effluents obtained from the prechlorinated water and those designated as "B" to the corresponding effluents of the nonprechlorination treatment. In each instance, the plotted points followed closely a straight-line trend, which is indicated by a line fitted to the points by the least-squares method. The general character of the relationships thus shown was the same as previously observed, both experimentally and at full-scale municipal plants, between the bacterial quality of raw waters as delivered for treatment and that of the effluents produced from them at various stages of treatment.[8]

From the intersections of these lines with the various ordinates the relative average numbers of *B. coli* observed, with and without prechlorination, in the effluent of each successive stage of treatment, corresponding to given numbers in the raw water, could be readily compared. Such a comparison indicated that with raw water *B. coli* indices falling within the limits, 1,000 to 30,000, prechlorination, as an auxiliary measure, effected a net reduction in *B. coli* numbers ranging from 92 to 96 per cent after coagulation-sedimentation, from 87 to 92 per cent after filtration, and from 40 to 65 per cent after postchlorination. Although the over-all reduction thus shown was less proportionately than at the earlier stages of treatment, it was substantial enough to signify the well-marked increase in over-all efficiency accomplished through the aid of prechlorination.

A question of more practical interest from the viewpoint of this study, on which the plots shown in the chart afforded evidence, was that of the effect of prechlorination on the maximum *B. coli* index of the raw water corresponding to a quality of effluent meeting an accepted standard of limiting *B. coli* content. On referring to the chart it will be noted that in the absence of prechlorination the maximum raw water *B. coli* index corresponding to a quality of postchlorinated effluent meeting the revised Treasury Department standard (i. e., having a *B. coli* index not exceeding 1.0 per 100 c. c.) approximated 10,000, whereas with prechlorination the maximum slightly exceeded 20,000. Similarly, it is indicated that the raw

[8] See Public Health Bulletins Nos. 172 and 193.

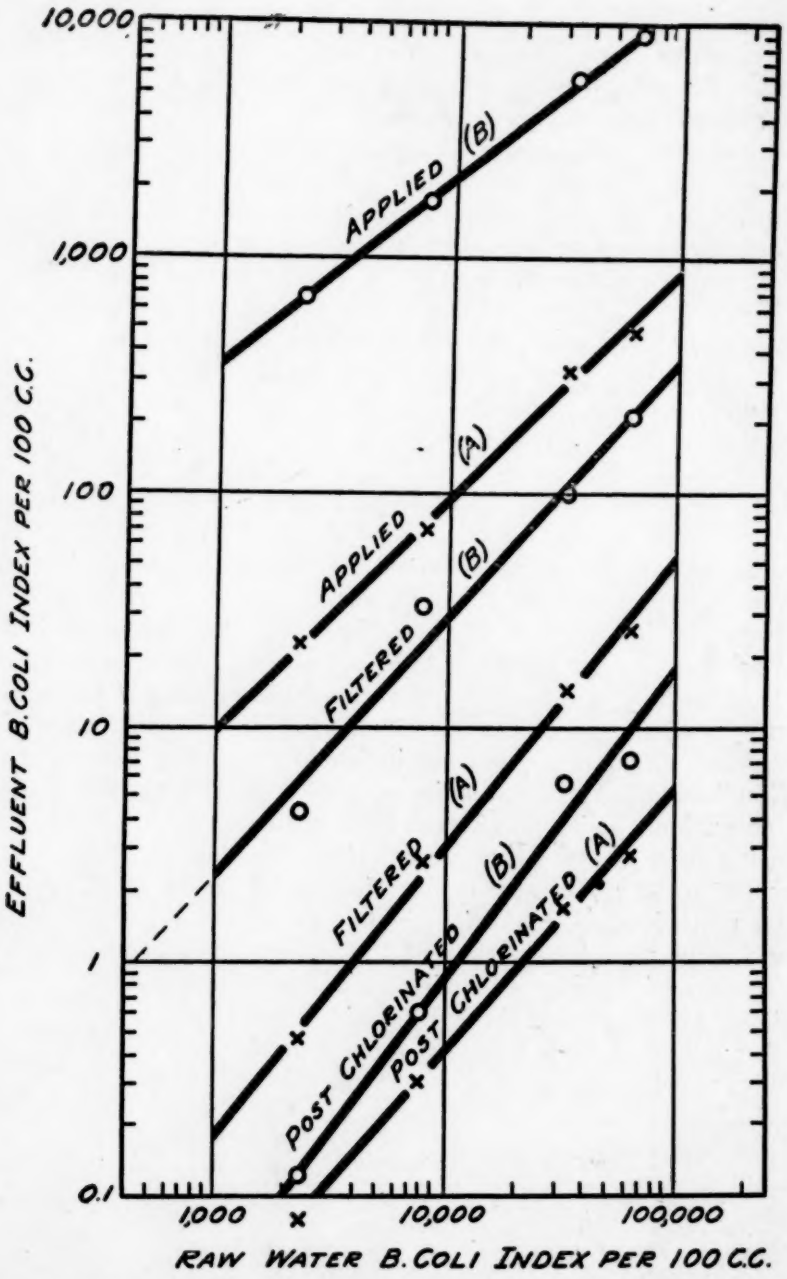

FIGURE 8.—Logarithmic plot showing comparative relations observed between averages of numbers of raw water *B. coli* falling within various ranges and corresponding numbers in effluents of successive stages of treatment, with and without prechlorination. (Based on data given in Table No. 4)

water *B. coli* maximum corresponding to a quality of filtered effluent meeting the same standard approximated 450 without prechlorination and 3,700 with prechlorination.

In so far as these experiments are concerned, they indicate therefore that a postchlorinated effluent of standard quality, as above defined, could be produced from a raw water slightly more than twice as highly polluted, from the standpoint of *B. coli* content, as was possible under the conditions of these experiments without prechlorination. As these conditions were such as to yield somewhat higher average efficiencies of bacterial removal without prechlorination than would be expected from previous observations [9] to occur in the routine performance of the average filter plant of the more simple type, the foregoing statement probably represents a fairly conservative estimate of the proportionate gain in permissible raw water pollution which might be expected to result from prechlorination in normal practice.

From a study of the relationships shown between the average numbers of *B. coli* observed in the influent and effluent waters of filtration and postchlorination, respectively (each being considered as a separate stage of treatment), it was indicated that under similar conditions of bacterial density in the influent water, the efficiency of each one of these two stages was decidedly less in treating prechlorinated water than in treating nonprechlorinated water. These differences are brought out in Figures 9 and 10, the former being a logarithmic plot of the applied versus filtered water group averages given in Table 4 and the latter a similar plot of the filtered versus postchlorinated averages in the same table.

On referring to Figure 9, it thus is shown that with a *B. coli* index of the applied water equivalent to 500, the indicated efficiency of *B. coli* removal by the filter receiving prechlorinated water was 94.6 per cent, whereas that of the filter-treating nonprechlorinated water was 99.2 per cent. In Figure 10, it likewise is shown that with a *B. coli* index of the filtered effluent equal to 50, the indicated efficiency of postchlorination, as applied to the prechlorinated water, was 90 per cent whereas with respect to the nonprechlorinated water it was 96.6 per cent.

From these observations it would appear that some condition resulting from prechlorination, other than lowered bacterial density, brought about a consistent and well-marked decrease in the bacterial efficiency both of filtration and of postchlorination. As regards filtration, it is possible that the constant reception of water containing small amounts of residual chlorine may have disturbed the normal biological condition of the filter sufficiently to cause a slightly di-

[9] See Public Health Bulletins Nos. 172 (p. 173) and 193 (p. 86); also Reprint No. 1114 from the Public Health Reports (p. 24).

minished bacterial efficiency. As regards postchlorination, it is conceivable that the elimination of the less resistant strains of bacteria by prechlorination may have left in the effluent of the filter receiving prechlorinated water a group of bacteria having a higher average degree of resistance to the action of chlorine than was present in the effluent of the filter receiving nonprechlorinated water. Although

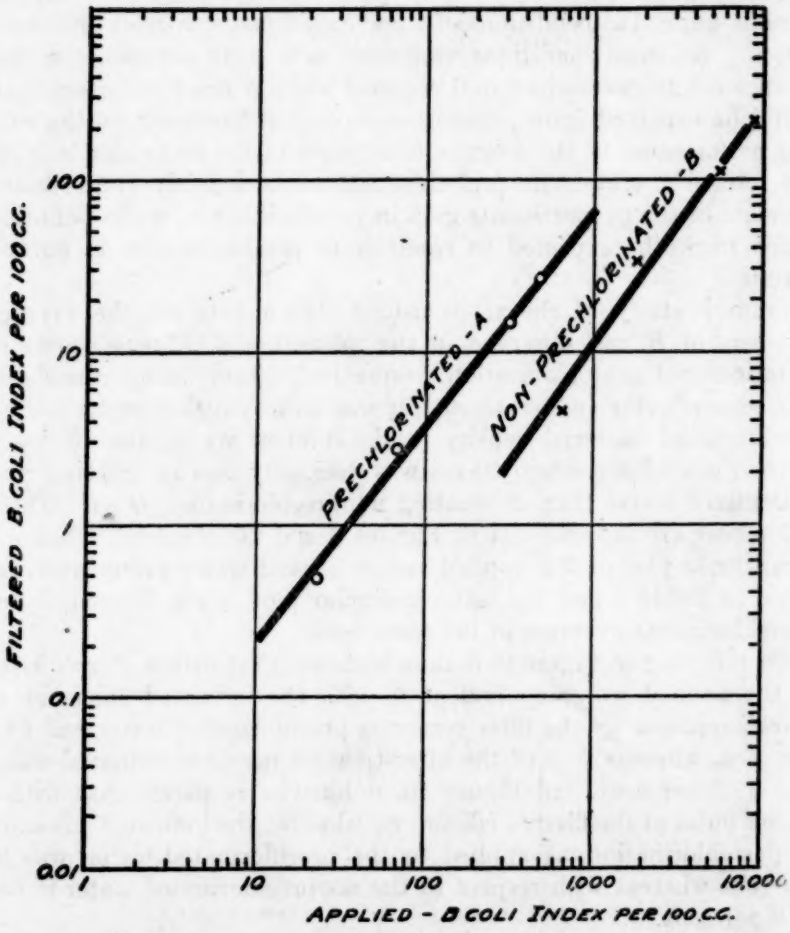

FIGURE 9.—Comparative relations observed between *B. coli* index of water applied to filters receiving prechlorinated and nonprechlorinated waters, respectively, and corresponding *B. coli* index of unchlorinated effluents of these filters. (Based on data given in Table No. 4)

the true reasons for the phenomena observed must remain, for the present at least, unexplained, the significance of these phenomena is fairly evident. In so far as any generalized conclusion may be drawn from these observations, it would seem to be that where raw water prechlorination is practiced regularly and continuously, a certain degree of impairment in the normal bacterial efficiency of filtration

and of postchlorination may be expected to occur. From a practical standpoint such impairment may not be highly important, considering the extent to which it appears to be offset by the effect of prechlorination.

Supplementary observations.—In addition to tests concerned with the effect of prechlorination on the efficiency of bacterial removal,

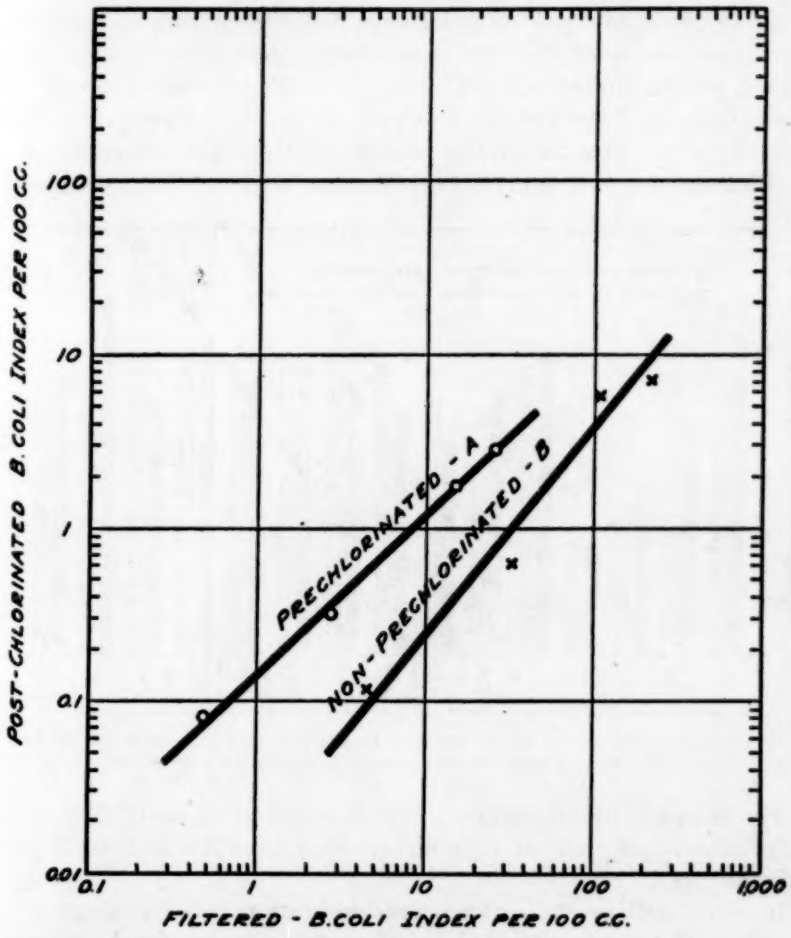

FIGURE 10.—Comparative relations observed between *B. coli* index of unchlorinated effluents of filters receiving prechlorinated and nonprechlorinated waters, respectively, and corresponding *B. coli* index of the same effluents after postchlorination. (Based on data given in Table No. 4)

supplementary observations were made, during the course of the experiments, on certain other aspects of the problem, notably the following:

1. The effect of prechlorination on the development of microscopic organisms in the sedimentation basin and filter.
2. The influence of prechlorination on the length of filter run.

3. The effects of residual chlorine in the applied water on the biological condition of the filter sand.

4. The comparative performances of the plant with relatively low and high chlorine residuals in the prechlorinated water.

Although growths of microscopic organisms developed in the water on only a few brief occasions with sufficient intensity to cause perceptible effects on the operation of the plant, the section of the basin receiving prechlorinated water was noticeably freer from such growths throughout the course of the experiments than was the section receiving unchlorinated water. The difference in this respect was particularly well marked in reference to attached growths, which generally were present in the section of the basin receiving nonprechlorinated water, but practically always absent from the section

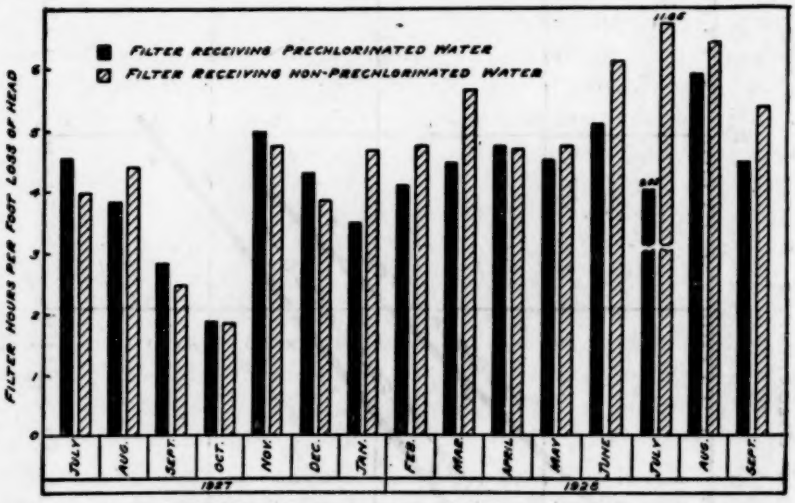

FIGURE 11.—Comparative monthly average periods of service, in filter hours per foot loss of head, of filters receiving prechlorinated and nonprechlorinated water, respectively

receiving prechlorinated water. Prechlorination undoubtedly exerted a beneficial influence in minimizing such growths and their usual consequences.

In spite of these indications, prechlorination failed to display any well-defined tendency toward lengthening filter runs, possibly due, in part at least, to the necessity of adding the coagulant to the raw water before, rather than after, its prechlorination. Whatever the reason, it was observed that the filter receiving prechlorinated water yielded the longer average period of service in only 6 of the 15 months covered by the comparative record. Especially noteworthy in this connection was the failure of this filter to show a longer average run during the last three months of the experiment, when the residual chlorine content of the prechlorinated water was greatly increased. (See fig. 11.)

With a view to ascertaining the extent to which the presence of relatively high residual chlorine in the applied water might affect the biological condition of the filter sand, a series of comparative examinations were made, between June 21 and September 13, 1928, of the bacterial content and 5-day biochemical oxygen demand of samples of sand collected near the surface and at approximately mid-depth of each filter.

At the beginning of the observations, when filter A had been receiving for about a year, prechlorinated water carrying a residual chlorine of 0.02 to 0.05 p. p. m., the bacterial content of the sand in the upper strata of this filter was found to be about 10 per cent of that of the sand in filter B receiving unchlorinated water. As the residual chlorine in the water applied to filter A was increased, this ratio became progressively diminished. At the end of the period, when the residual chlorine of the water applied to filter A had reached about 0.8 p. p. m. the upper strata of this filter contained fewer plate-growing bacteria and were practically free of *B. coli*. The lower strata still yielded considerable numbers of bacteria at this time, though they were somewhat lower than in filter B.

In the foregoing connection it is of interest to note the fairly definite relationship observed between the residual chlorine content of the water applied to filter A and both the bacterial content and oxygen demand of the sand near the surface of this filter. This relationship is illustrated in Figures 12 and 13 by plots of the observations. In Figure 12 the plotted points followed two more or less distinct trends, as indicated by the two dashed-line curves drawn through them. Although the reasons for this divergence were not clear, it appears to have been associated with differences in the action of chlorine in the bacterial flora of the filter during the earlier and later portions, respectively, of the test period. No similar divergence was observed in the oxygen demand plots in Figure 13.

Throughout the period of heavy prechlorination the numbers of bacteria and the biochemical oxygen demand of the sand near the surface of filter A were very considerably less than in the lower strata, indicating that a large proportion of the chlorine absorption by the filter sand occurred in the upper strata. The extent of this absorption may be illustrated by noting that during a period of five weeks, when the residual chlorine content of the applied water averaged 0.76 p. p. m., the corresponding residual in the filtered effluent averaged 0.01 p. p. m., the estimated amount of chlorine absorbed by the filter being, by difference, 0.75 mg. per liter of water filtered, or about 0.4 pound per square foot of filter surface.

Although the major portion of the chlorine thus absorbed appears to have been consumed by the organic matter lodged in the filtering medium, a small part of it seemingly was stored in the filter in its free

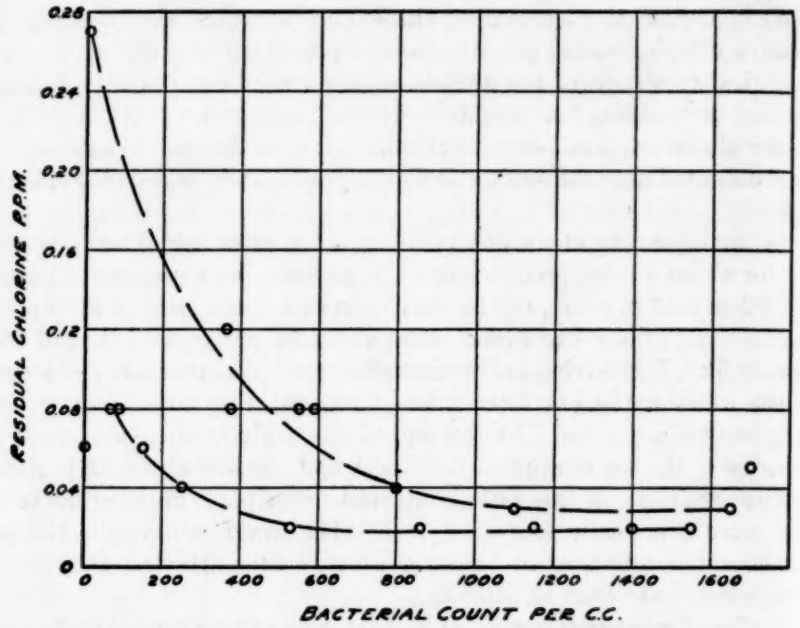

FIGURE 12.—Relation observed between residual chlorine content of water applied to filter A and bacterial content of samples of sand collected from the upper stratum of this filter

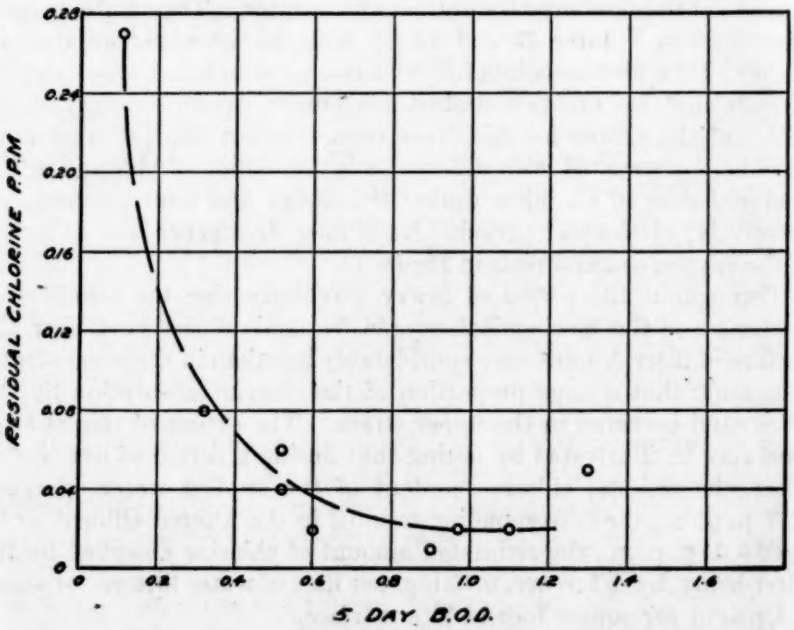

FIGURE 13.—Relation observed between residual chlorine content of water applied to filter A and 5-day biochemical oxygen demand of samples of sand collected from the upper stratum of this filter

state, as was evidenced by the distinct lag, extending over a period of two weeks, observed in the rate of decrease in the residual chlorine of the filtered effluent following a sharp reduction in the chlorine content of the applied water to less than 0.2 p. p. m.

Perhaps the most significant feature of these observations, however, was the persistence of bacterial life in filter A during the 10 weeks of heavy prechlorination, when the residual chlorine content of the applied water averaged 0.6 p. p. m. and ranged as high as 1.2 p. p. m. The only reasonable explanation which can be offered for this phenomenon was that the heavy absorption of chlorine occurring in the upper part of the filter probably reduced the residual chlorine in the water passing through the filter to an extent such that its bactericidal action was lost when it had reached the lower strata.

The data from the entire series of experiments, extending over 16 months, indicated that more consistent and, on the whole, more effective results were obtained from carefully controlled prechlorination of the raw water to a degree such as to maintain a low residual chlorine content of the applied water, averaging about 0.05 p. p. m. and not exceeding 0.1 p. p. m. during short periods. Heavy prechlorination, to the extent carried during the last three months of the period, gave a higher degree of bacterial reduction through the preliminary basin treatment than did simple prechlorination, but exerted a marked disturbing effect on the efficiency of filtration, which was less apparent when a water of low residual chlorine was applied to the same filter.

CONCLUSIONS

The conclusions drawn from the experiments described in this paper may be summarized briefly as follows:

1. Raw water prechlorination, when properly controlled, affords an effective and economical means of reinforcing the bacterial efficiency of rapid sand water filtration processes, these experiments having indicated that the permissible density of *B. coli* in the raw water could be slightly more than doubled by use of this measure.

2. Maintenance of a controlled low residual chlorine in the applied water, averaging 0.05 p. p. m. and not exceeding 0.10 p. p. m., gave more consistent and, in general, more satisfactory results than did superchlorination, with a high residual chlorine.

3. The bacterial efficiencies of filtration and of postchlorination appear, from these observations, to be measurably reduced as the result of prechlorination.

4. Although the length of filter run was not increased by prechlorination under the conditions of these experiments, the development of growths of microscopic organisms was perceptibly retarded by this treatment.

5. The application of prechlorinated water to rapid sand filters appears to lower the bacterial content and the biochemical oxygen demand of the filtering medium. Variations in both of these elements were found to bear a fairly definite relation to concurrent variations in the residual chlorine of the applied water.

More general observations made in the course of the experiments confirmed the prevalent impression that it is advantageous to prechlorinate before, rather than after, preliminary sedimentation in order to utilize the stabilizing effect of basin treatment prior to applying prechlorinated water to filters. They also indicated, however, that even with the stabilizing influence of such basin treatment careful technical supervision and laboratory control are necessary to maintain a relatively constant chlorine content of water applied to filters, which appears to be a desirable condition for consistently effective filtration. Although the ability of well-ripened filters to absorb excessive amounts of chlorine for considerable periods of time constitutes a valuable operating factor of safety, in so far as the production of overchlorinated effluents is concerned, any undue burdening of filters with excessively chlorinated water may be expected, as shown in these studies, to result in a measurable impairment of their bacterial efficiency.

In conclusion, the main advantage of prechlorination, from the viewpoint of this study, may be summed up as being its effectiveness and relative economy as a measure for reinforcing the over-all bacterial efficiency of the rapid-sand filtration process, when considered as a whole. Its principal disadvantage appears to be its tendency to cause a perceptible decrease in the bacterial efficiency of filtration and of postchlorination. From a practical standpoint this advantage appears, from the study herein described, to be outweighed by the advantage above indicated, though it should be taken into account in casting up a balance sheet of performance to be expected in applying this method of treatment.

CONSECUTIVE READINGS OF PULSE RATE ON A SMALL GROUP OF CLERKS

By Rollo H. Britten, *Associate Statistician*, and C. R. Wallace, *formerly Acting Assistant Surgeon, Office of Industrial Hygiene and Sanitation, United States Public Health Service*

Incidental to an uncompleted study of daily variations in blood pressure, consecutive readings of pulse rate were made on a group of 11 men and 11 women doing clerical work between the dates of March 9, 1927, and July 1, 1928. Between 105 and 120 observations were made on each person.[1]

[1] Six individuals who were not included throughout the period of study are omitted from this analysis.

The age of each individual included in this study, together with his height and weight, is given in Table 1. In the last column is presented the amount each person's weight deviates from the average weight for his height and age, compiled by the Association of Life Insurance Medical Directors and the Actuarial Society of America.[2]

TABLE 1.—*Characteristics of individuals included in study*

Subject No.	Age	Height	Weight	Deviation [1]	Subject No.	Age	Height	Weight	Deviation [1]
MALE					FEMALE				
3	22	71	141	−17	23	20	66	119	−14
8	23	65	113	−22	26	25	63	98	−27
6	30	63	170	+36	22	27	64	153	+24
13	34	68	146	−8	27	29	65	100	−32
4	35	66	151	+3	24	38	65	113	−27
11	37	70	141	−26	25	39	63	201	+69
14	47	66	172	+20	20	40	62	109	−24
9	50	68	163	−1	18	45	67	183	+25
2	59	70	187	+15	19	53	67	113	−44
7	60	71	172	−6	17	55	67	166	+9
10	66	65	148	−1	21	62	65	132	−16

[1] Deviations from height-weight-age tests (average weight for specific height and age). See p. 160, Public Health Bulletin No. 162.

The pulse rate was counted as a rule for 15 seconds, but in case of doubt the time was extended. Of course, the figure as set down would be the calculated number of beats per minute. In view of this method of counting the pulse rate, it is evident that the distribution will show a concentration upon certain values, especially those divisible by four; hence, there appears to be no advantage in giving the distributions to the final unit. Instead they have been classed in groups the center of which will invariably be a number divisible by 4, i. e., 50–54, 54–58, 58–62, etc. Items falling exactly at the class limits have been divided, one-half being put in the class below and the other half in the class above. Since so large a proportion of readings were taken for 15 seconds, it is simpler to think of actual readings of 60, 64, 68, 72, etc., instead of the class interval, and the tables have been made up this way.

The pulse rates were obtained during two distinct periods. In the first period, starting March 9, 1927, 50 readings were taken in the morning on each person. These readings were made daily except Saturday and Sunday. In general, this period closed about the end of May, 1927, but on some individuals, in order to obtain the 50 readings, it was necessary to continue the readings somewhat later. The second period ran from December 16, 1927, to May 27, 1928. During this time readings were made three times a week in the morning, those of the men being taken on Monday, Wednesday, and Friday, and those of the women on Tuesday, Thursday, and Saturday.

[2] A Health Study of Ten Thousand Male Industrial Workers, by Rollo H. Britten, associate statistician, and L. R. Thompson, surgeon. Public Health Bulletin No. 162, p. 160.

The readings were made at the beginning of the blood-pressure examinations, but the subject was given a short time to rest before the reading was taken. No effort was made to control the activities of the subject prior to the reading; but, as stated, the group was one doing clerical work, and in most cases no physical exercise had been indulged in immediately before the reading, except that involved in walking to the examination room. No doubt part of the variation in the reading was the result of excitement which individuals might have sometimes been under before the pulse rate was determined.

In regard to the physical condition of the group examined, it can be stated that no serious sickness occurred during the period of the study. The group as a whole seemed to be in about the same physical condition as would be found in any ordinary group of clerical workers. Few of them appeared to be in the habit of taking systematic physical exercise.

The average pulse rate obtained for each person during the entire study is given in Table 2.

TABLE 2.—*Average pulse rate by individuals*

Subject No.	Average pulse rate	Subject No.	Average pulse rate
MEN		WOMEN	
10	91.4	23	86.9
14	82.4	19	79.2
4	78.0	22	76.2
3	77.3	24	76.1
8	75.9	25	70.6
13	75.9	17	70.5
6	75.1	20	69.9
2	74.2	27	69.7
7	71.6	18	69.2
11	68.1	26	69.2
9	65.6	21	68.8
Average	76.0	Average	73.3
		Both sexes, average	74.6

It will be found that the pulse rates of this small group vary from 91.4 to 65.6, with an average of 74.6. Although somewhat lower than would apparently be found in an industrial group of workers,[3] the rates for this clerical group do not seem abnormal. No emphasis is placed upon the average for the group or the differences between men and women, because it is obvious that the number included in the study is too small to be representative. For the same reason no data are included as to the correlation of pulse rate and such factors as age, height, or weight.

The value of these data lies rather in the amount of variation found in any one individual on different days. In Table 3 is given a distribution of pulse-rate readings for each subject and these distributions

[3] An average of 81.1 was found for the pulse rate of a group of ten thousand industrial workers. Public Health Bulletin No. 162. It must be recalled that in this study only one observation was made on a person.

are represented by the graphs in Figure 1, where the ordinate scale represents the number of readings found at any given pulse rate, as indicated along the abscissal scale.

TABLE 3.—*Distribution of pulse rate readings*

Subject No.	52	56	60	64	68	72	76	80	84	88	92	96	100	104	108	112	116
MEN																	
10					2	1	8	11	8	17	15	22	17	7	4	1	
14					2	10	13	38	24	15	9	5	2				
4					2	27	32	35	13	7	2						
3			2	7	9	25	22	26	11	5	2	2	2	1			1
8			1	3	12	36	24	25	6	6	2		1				
13				1	10	32	31	31	9	1							
6				2	11	35	30	27	2	1	1						
2				3	17	40	36	17	3	2							
7			5	14	27	33	21	8	4	1		1					
11		2	10	29	33	32	3	1	3	1							
9	3	3	24	31	31	13	5	2	1								
WOMEN																	
23						6	9	20	13	28	17	21	3	1			
19				1		11	25	58	13	5		1					
22				5	13	29	23	30	7	9		1					
24			1	10	20	19	16	27	9	7	5	2					
25	2	6	6	16	22	23	18	10	6		1	1					
17		2	5	14	30	37	17	4		2	1						
20		1	4	25	31	25	19	8		1							
27		1	12	20	33	28	13	6	5	1							
18		1	4	34	29	27	12	7		2							
26			4	16	48	24	13	1	1								
21		7	6	25	31	19	10	5	2	2	1						

What is most striking in this picture of individual readings from day to day is the wide variation which is found. Part of this may be due to acute illness or unusual conditions of excitement, but it is evident that the normal course of pulse rates from day to day contains an element of great variability. It will be observed that there is considerable contrast among the subjects with respect to such fluctuation. For instance, Nos. 13, 2, 19, and 26 show relatively little fluctuation, while quite the opposite is true of 10, 3, 24, 25, and 21.

To give a more precise measure of the individual variations from day to day the standard deviation [4] and coefficient of variability [5] have been calculated and are given in Table 4.

[4] *Standard deviation.*—The common measure of variability, derived from principles of least squares and mechanics. The mean of a series is obtained and is subtracted from each item. These deviations are squared. The squares are added together and divided by the number of items in the series. The square root of the quotient is obtained. This is the same process as that followed in obtaining the "radius of gyration" in mechanics, and as such is a measure of the absolute amount of variation from the mean.

[5] *Coefficient of variability.*—The standard deviation measures the absolute fluctuation of items around their mean. These values are clearly dependent on the mean. Other things being equal, if the mean of one series is twice the mean of another, the fluctuation will be twice as great. Therefore, for comparative purposes, it is desirable to know how much fluctuation occurs relative to the mean. Obviously, this may be ascertained by dividing the standard deviation by the mean, giving the coefficient of variability. The value is usually expressed as a percentage.

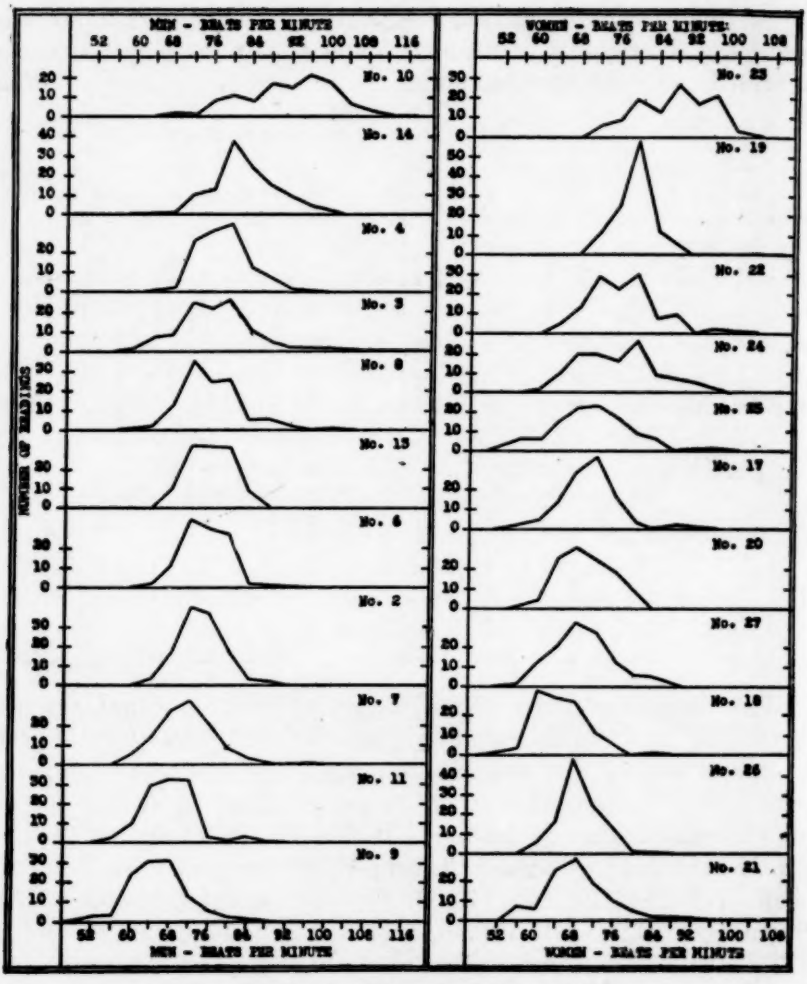

FIGURE 1.—Distribution of pulse rate readings by individuals

TABLE 4.—*Constants of variability for each subject*

Subject No.	Standard deviation	Coefficient of variability	Subject No.	Standard deviation	Coefficient of variability
MEN			WOMEN		
10	9.31	10.2	23	7.41	8.5
14	6.61	8.0	19	4.25	5.4
4	5.06	6.5	22	5.60	7.3
3	9.16	11.9	24	7.97	10.5
8	6.41	8.4	27	6.30	9.0
13	4.67	6.1	17	5.81	8.2
6	4.71	6.3	25	8.01	11.4
2	4.62	6.2	18	5.70	8.2
7	6.13	8.6	20	5.54	7.9
9	5.70	8.7	26	4.29	6.2
11	5.47	8.0	21	7.03	10.2
Average	6.17	8.1	Average	6.17	8.4
			Both sexes, average	6.17	8.3

It is notable that the standard deviation varies among the different subjects, the lowest being 4.3 and the highest 9.3. There is no indication that the variation is significantly greater for one sex than for the other.

The standard deviation is of particular interest because of its relation to the probable error.[6] In view of the fact that the readings are usually divisible by 4, the probable errors are merely suggestive. The probable error of an individual item is roughly two-thirds of the standard deviation.[7] In other words, for individuals included in this study the probable error in the day-to-day reading varies from 2.9 to 6.3, with an average of 4.2. These values define limits within which it is an even chance that any pulse rate reading will fall. For instance, in the case of subject No. 3, the probable error of whose readings is 6.2, it is an even chance, theoretically, that any one reading will lie between 71.1 and 83.5, obtained by adding the probable error to the average of 77.3 and subtracting it from this average.

From these probable errors it is also possible to determine the precision of the means for each individual, since the probable error of the mean is calculated by dividing the probable error of an individual item by the square root of the number of items on which the mean is based. In the case of subject No. 3, on whom 115 observations were made, the probable error of the mean of 77.3 is 0.57. It is evident that the mean pulse rate of each individual in the study has been obtained with a great deal of precision.

The coefficients of variability have been included in the table to indicate the amount of relative dispersion about the mean. Such coefficients are abstract figures and can be compared more or less for different sorts of data. The values for the coefficient usually vary from about 3 for some classes of linear measurements to values as large as 40 or 50 for certain widely fluctuating data.[8] So far as is known, no other material is available for comparison with these coefficients, but it is of interest to contrast these coefficients with those representing variation from person to person.

TABLE 5.—(*A*) *Average coefficients of variability from day to day and* (*B*) *coefficients representing variation from person to person*

	Average of individual coefficients of variability	Coefficients of changes from person to person
Men	8.1	8.7
Women	8.4	7.5
Both sexes	8.3	8.3

[6] The curves given in the figure would appear to approximate a normal distribution closely enough to make the probable error applicable to this case.

[7] 0.6745 times the standard deviation.

[8] Medical Biometry and Statistics, by Raymond Pearl. P. 276.

This table indicates that the variability in pulse rate readings from day to day on a single individual is of the same order of magnitude as the variation in the pulse rate of different individuals. As reflection will show, this is rather surprising, and is a striking manifestation of the great variability in the readings from day to day on a single person.

In view of having successive readings on one person it was of interest to see how the first reading, which would presumably be more affected by uncertainty and excitement than the others, compared with later readings. Table 6 was prepared to bring this point out. It gives the first three readings made on each person (*a*) during the earlier period starting March 9, 1927, and (*b*) during the later period starting December 16, 1927. It will be observed that there is no tendency for the pulse rate to be higher at the earliest readings.

TABLE 6.—*Pulse rate readings on first three days of each period*

Subject No.	Period beginning Mar. 9, 1927			Period beginning Dec. 16, 1927		
	First	Second	Third	First	Second	Third
MEN						
10	100	98	96	96	96	84
14	78	72	72	80	78	72
4	68	72	74	74	72	74
3	78	80	86	70	76	72
8	72	72	78	88	88	80
13	69	68	72	80	80	72
6	72	70	68	92	82	80
2	80	78	76	68	76	72
7	60	62	64	84	66	64
11	64	68	64	58	68	72
9	64	72	68	66	60	64
Average	73.2	73.8	74.4	77.8	76.6	73.3
WOMEN						
23	72	72	72	72	96	80
19	72	74	65	76	80	80
22	80	78	72	78	80	74
24	70	72	68	80	92	76
25	68	58	52	76	60	67
17	68	72	72	72	72	68
20	68	74	72	78	64	60
27	68	66	68	60	68	64
18	70	72	63	68	68	64
21	64	70	72	68	72	68
26	68	60	76	68	64	68
Average	69.8	69.8	68.4	72.4	74.2	69.9
Both sexes	71.5	71.8	71.4	75.1	75.4	71.6

The chronological variations throughout the period of the study for each individual and for the group as a whole were also analyzed. Although individuals show some tendency to have low values for a number of days followed by unusually high values, it has not seemed worth while to bring this out in the tables, because of the limited amount of data. Furthermore, since the readings were usually taken for only 15 seconds, no accurate chronological picture of individual deviations could be presented. In the group as a whole a rise was

manifest from January to June, amounting on the average to about three beats per minute. This increase may well be seasonal in character, but until data are obtained covering 12 consecutive months no assurance can be felt that the relation to season is real. Hence the chronological curve for the whole group has not been presented.

SUMMARY

The interest of this paper for the physician or physiologist lies in its determination of the variation of the pulse rate in the same individual and the extent to which different persons manifest the same or dissimilar tendencies. The group studied consisted of 11 men and 11 women, apparently well, performing work of a clerical nature. Approximately 120 readings of pulse rate were taken on each person in the morning, either on consecutive days or three days a week.

The probable errors of the individual readings were calculated for each individual, the average for all persons being about four beats per minute. Thus, one-half of the readings would be expected to be at least four beats per minute greater or four beats per minute less than the average. Also readings deviating as much as 10 or 15 beats per minute from the true average might occasionally be expected without having any particular significance. Although this statement is true on the average, quite different results were obtained for many individuals, some showing much greater variation, others much less. The individual having the broadest variation showed a probable error of between six and seven beats per minute. The amount of variation from day to day among men seemed about equal to that among women.

Comparison of variation from day to day on single individuals with that from one person to another indicated that the two were of the same order of magnitude.

WHOLE-TIME COUNTY HEALTH OFFICERS, 1930

The following directory has been compiled from data furnished as of January 1, 1930, by State health officers. Similar directories for the years 1922 to 1929, inclusive, have been published in the PUBLIC HEALTH REPORTS. The directory for 1929 was issued as Reprint No. 1341.

In the questionnaire sent for the purpose of obtaining the necessary information, a "whole-time" county health officer was defined as "one who does not engage in the practice of medicine or in any other business, but devotes all his time to official duties."

Directories of State health departments have been published annually by the Public Health Service for the years 1912 to 1930, in-

clusive. The directory for 1929 was issued as Reprint No. 1334 from the PUBLIC HEALTH REPORTS.

Directories of city health officers have been published annually for the years 1916 to 1930, inclusive, the directory for 1929 being Reprint No. 1333.

Directories of State and city health officers for 1930 have been published in Public Health Reports of November 14, 1930 (Reprints Nos. 1425 and 1426 respectively).

State and county	Name of health officer	Post-office address	Official title
Alabama:			
Baldwin	J. A. Norris, jr., M. D.	Bay Minette	County health officer.
Barbour	E. M. Moore, M. D.	Clayton	Do.
Blount	C. V. Hendrix, M. D.	Oneonta	Do.
Bullock	A. M. Shelamer, M. D.	Union Springs	Do.
Calhoun	G. A. Cryer, M. D.	Anniston	Do.
Chambers	D. D. Carr, M. D.	Lafayette	Do.
Cherokee	S. C. Tatum, M. D.	Center	Do.
Choctaw	W. G. Carnathan, M. D.	Butler	Do.
Clarke	R. D. Neal, M. D.	Grove Hill	Do.
Cleburne	F. R. Wood, M. D.	Heflin	Do.
Coffee	W. A. Stanley, M. D.	Enterprise	Do.
Colbert	W. T. Burkett, M. D.	Tuscambia	Do.
Conecuh	E. L. Kelly, M. D.	Evergreen	Do.
Covington	T. R. Mellard, M. D.	Andalusia	Do.
Crenshaw	J. O. Foster, M. D.	Luverne	Do.
Cullman	V. P. Hughes, M. D.	Cullman	Do.
Dale	W. L. Orr, M. D.	Ozark	Do.
Dallas	L. T. Lee, M. D.	Selma	Do.
De Kalb	W. A. Black, M. D.	Fort Payne	Do.
Elmore	L. R. Poole, M. D.	Wetumpka	Do.
Escambia	G. C. Mariette, M. D.	Brewton	Do.
Etowah	W. H. Harper, M. D.	Gadsden	Do.
Franklin	L. J. Graves, M. D.	Russellville	Do.
Geneva	L. S. Nichols, M. D.	Geneva	Do.
Houston	R. E. Neff, M. D.	Dothan	Do.
Jackson	M. H. Lynch, M. D.	Scottsboro	Do.
Jefferson	J. D. Dowling, M. D.	Birmingham	Do.
Lamar	J. A. Jackson, M. D.	Vernon	Do.
Lauderdale	W. D. Hubbard, M. D.	Florence	Do.
Lawrence	R. E. Harper, M. D.	Moulton	Do.
Lee	C. M. Moore, M. D.	Opelika	Do.
Limestone	L. R. Murphree, M. D.	Athens	Do.
Lowndes	E. F. Leatherwood, M. D.	Hayneville	Do.
Macon	E. S. Miller, M. D.	Tuskegee	Do.
Madison	W. C. Hatchett, M. D.	Huntsville	Do.
Marengo	J. R. Long, M. D.	Linden	Do.
Marshall	D. C. Jordan, M. D.	Guntersville	Do.
Mobile	C. A. Mohr, M. D.	Mobile	Do.
Monroe	T. E. Tucker, M. D.	Monroeville	Do.
Montgomery	J. L. Bowman, M. D.	Montgomery	Do.
Morgan	H. C. McRee, M. D.	Decatur	Do.
Pickens	J. L. Conyers, M. D.	Carrollton	Do.
Pike	W. H. Abernethy, M. D.	Troy	Do.
Shelby	R. W. Ball, M. D.	Columbiana	Do.
Sumter	J. S. Hough, M. D.	Livingston	Do.
Talladega	J. H. Hill, M. D.	Talladega	Do.
Tallapoosa	C. C. Fargason, M. D.	Dadeville	Do.
Tuscaloosa	A. A. Kirk, M. D.	Tuscaloosa	Do.
Walker	A. M. Waldrop, M. D.	Jasper	Do.
Washington	I. C. Sumner, M. D.	Chatom	Do.
Wilcox	E. L. McIntosh, M. D.	Camden	Do.
Winston	R. E. Tyler, M. D.	Double Springs	Do.
Arizona:			
Cochise	R. B. Durfee	Bisbee	County superintendent of public health.
Coconino	G. F. Manning, M. D.	Flagstaff	Do.
Yuma	Harry A. Reese, M. D.	Yuma	County health officer.
Arkansas:			
Arkansas			Medical director.
Ashley	M. F. Houston, M. D.	Hamburg	Do.
Conway	W. H. Bruce, M. D.	Morrilton	Do.
Cross	J. D. McKie, M. D.	Wynne	Do.
Desha	J. C. Miller, M. D.	McGehee	Do.
Drew	G. C. De Bolt, M. D.		Do.
Garland	J. F. Merritt, M. D.	Hot Springs	Do.
Jackson	W. P. Moore, M. D.	Newport	Do.
Jefferson	Geo. A. Hays, M. D.	Pine Bluff	Do.

State and county	Name of health officer	Post-office address	Official title
Arkansas—Continued.			
Little River	J. W. Ringgold, M. D.	Ashdown	Medical director.
Mississippi	A. M. Washburn, M. D.	Blytheville	Do.
Monroe	A. J. Dunklin, M. D.	Clarendon	Do.
Phillips	W. R. Bruce, M. D.	Helena	Do.
Pope	A. B. Tate, M. D.	Russellville	Do.
Pulaski	C. McA. Wassell, M. D.	Little Rock	Do.
Saline	T. C. Watson, M. D.	Benton	Do.
Sebastian	J. E. Johnson, M. D.	Fort Smith	District health officer.
Union	Ernest W. Prothro, M. D.	El Dorado	Medical director.
White	Orlie Parker, M. D.	Searcy	Do.
Woodruff	J. F. Hays, M. D.	McCrory	Do.
Yell	T. J. Pool, M. D.	Ola	Do.
California:			
Contra Costa	I. O. Church, M. D.	Martinez	Health officer.
Los Angeles	J. L. Pomeroy, M. D.	Los Angeles	Do.
Madera	H. B. Neagle, M. D.	Madera	Do.
Monterey	Roy M. Fortier, M. D.	Salinas	Do.
Orange	K. H. Sutherland, M. D.	Santa Ana	Do.
Riverside	W. B. Wells, M. D.	Riverside	Do.
San Diego	Alex. M. Lesem, M. D.	San Diego	Do.
San Joaquin	J. J. Sippy, M. D.	Stockton	Do.
San Luis Obispo	Allen F. Gillihan, M. D.	San Luis Obispo	Do.
Santa Barbara	R. C. Main, M. D.	Santa Barbara	Do.
Stanislaus	C. H. Tenent, M. D.	Modesto	Do.
Yolo	Fred Fairchild, M. D.	Woodland	Do.
Colorado:			
Otero	Guy A. Ashbaugh, M. D.	Rocky Ford	Do.
Connecticut:			
Fairfield (town)	Lawrence Poole, M. D.	Fairfield	Do.
Florida:			
Manatee	J. W. Hennegan, D. V. M.	Bradenton	County health officer.
Sarasota	J. R. Scully, D. V. M.	Sarasota	Do.
Georgia:			
Baldwin	J. D. Wiley, M. D.	Milledgeville	Commissioner of health.
Bartow	H. C. Pearson, M. D.	Cartersville	Do.
Bibb	J. D. Applewhite, M. D.	Macon	Do.
Brooks	R. E. McClure, M. D.	Quitman	Do.
Chatham	V. H. Bassett, M. D.	Savannah	Do.
Clarke	T. H. Johnston, M. D.	Athens	Do.
Clinch	J. H. Sessions, M. D.	Homerville	Do.
Cobb	J. E. Lester, M. D.	Marietta	Do.
Coffee	J. W. Wallace, M. D.	Douglas	Do.
Colquitt	T. H. Chesnutt, M. D.	Moultrie	Do.
Crisp	Guy G. Lunsford, M. D.	Cordele	Do.
Decatur	M. A. Fort, M. D.	Bainbridge	Do.
De Kalb	J. R. Evans, M. D.	Decatur	Do.
Dougherty	Hugo Robinson, M. D.	Albany	Do.
Emanuel	J. R. Dykes, M. D.	Swainsboro	Do.
Floyd	B. V. Elmore, M. D.	Rome	Do.
Glynn	H. L. Akridge, M. D.	Brunswick	Do.
Grady	R. A. Berry, M. D.	Cairo	Do.
Hall	C. J. Wellborn, M. D.	Gainesville	Do.
Jefferson	W. K. Stewart, M. D.	Louisville	Do.
Jenkins	S. H. Haddock, M. D.	Millen	Do.
Laurens	O. H. Cheek, M. D.	Dublin	Do.
Lowndes	G. T. Crozier, M. D.	Valdosta	Do.
Mitchell	C. O. Rainey, M. D.	Camilla	Do.
Richmond	E. E. Murphey, M. D.	Augusta	Do.
Spalding	W. C. Humphries, M. D.	Griffin	Do.
Sumter	W. H. Houston, M. D.	Americus	Do.
Thomas	H. B. Jenkins, M. D.	Thomasville	Do.
Troup	S. C. Rutland, M. D.	Lagrange	Do.
Walker	J. H. Hammond, M. D.	La Fayette	Do.
Ware	Geo. E. Atwood, M. D.	Waycross	Do.
Washington	O. L. Rogers, M. D.	Sandersville	Do.
Wayne	F. C. Story, M. D.	Jesup	Do.
Worth	W. C. Tipton, M. D.	Sylvester	Do.
Idaho:			
Bonneville	B. L. Arms, M. D.	Idaho Falls	County health officer.
Twin Falls	Geo. C. Halley, M. D.	Twin Falls	Do.
Illinois:			
Du Page	W. V. Hopf, D. D. S.	Wheaton	Superintendent, county health department.
Morgan	W. H. Newcomb, M. D.	Jacksonville	Acting county health officer.
Kansas:			
Brown	R. B. Stafford, M. D.	Hiawatha	Health officer.
Butler	R. J. Cabeen, M. D.	Eldorado	County health officer.
Cherokee	C. R. Hepler, M. D.	Columbus	Health officer.
Dickinson	C. H. Munger, M. D.	Abilene	Do.
Geary	H. R. Ross, M. D.	Junction City	County health officer.
Greenwood	C. L. Miller, M. D.	Eureka	Health officer.
Lyon	J. S. Fulton, M. D.	Emporia	Do.

State and county	Name of health officer	Post-office address	Official title
Kansas—Continued.			
Marion	J. H. Saylor, M. D.	Marion	County health officer.
Ottawa	H. L. Hendricks, M. D.	Minneapolis	Health officer.
Sedgwick	M. H. Hostetler, M. D.	Wichita	Do.
Shawnee	F. E. McCord, M. D.	Topeka	Do.
Kentucky:			
Ballard	G. L. Thompson, M. D.	Wickliffe	Director of health.
Bell	M. D. Hoskins, M. D.	Pineville	Do.
Boyd	R. D. Higgins, M. D.	Ashland	Do.
Breathitt	L. E. Smith, M. D.	Jackson	Do.
Bullitt	G. W. Kirk, M. D.	Shepherdsville	Do.
Calloway	Jas. A. Outland, M. D.	Murray	Do.
Carlisle	H. W. Sterling, M. D.	Bardwell	Do.
Carter	G. E. Cecil, M. D.	Grayson	Do.
Daviess	S. E. Hainline, M. D.	Owensboro	Do.
Elliott	W. H. Wheeler, M. D.	West Liberty	Do.
Estill	S. T. Scrivner, M. D.	Irvine	Do.
Fayette	R. E. May, M. D.	Lexington	Do.
Floyd	Marvin Ransdell, M. D.	Prestonsburg	Do.
Fulton	H. E. Prather, M. D.	Hickman	Do.
Henderson	E. Cameron, M. D.	Henderson	Do.
Hickman	Chas. Hunt, M. D.	Clinton	Do.
Hopkins	C. R. Morton, M. D.	Madisonville	Do.
Jefferson	E. P. Whistler, M. D.	Louisville	Do.
Johnson	C. F. Holtegel, M. D.	Paintsville	Do.
Kenton	H. C. White, M. D.	Covington	Do.
Knott	J. W. Duke, M. D.	Hindman	Do.
Knox	M. W. Steele, M. D.	Corbin	Do.
Lawrence	M. H. Skaggs, M. D.	Louisa	Do.
Lee	R. H. MacLeod, M. D.	Beattyville	Do.
Leslie	H. C. Capps, M. D.	Hyden	Do.
Letcher	R. D. Collins, M. D.	Whitesburg	Do.
Magoffin	L. C. Coleman, M. D.	Salyersville	Do.
Martin	Wm. N. Keith, M. D.	Inez	Do.
Mason	J. H. Hutchings, M. D.	Maysville	Do.
McLean	J. W. Scudder, M. D.	Calhoun	Do.
Menifee	E. T. Riley, M. D.	Frenchburg	Do.
Monroe	G. W. Bushong, M. D.	Tompkinsville	Do.
Morgan	W. H. Wheeler, M. D.	West Liberty	Do.
Muhlenberg	L. D. Whitaker, M. D.	Greenville	Do.
Ohio	A. D. Park, M. D.	Hartford	Do.
Owsley	Don E. Wilder, M. D.	Boonville	Do.
Perry	John O. Salyers, M. D.	Hazard	Do.
Pike	F. W. Forge, M. D.	Pikeville	Do.
Scott	A. Stewart, M. D.	Georgetown	Do.
Trigg	Inman Smith, M. D.	Cadiz	Do.
Union	J. F. Lynn, M. D.	Morganfield	Do.
Wayne	Norman Westlund, M. D.	Monticello	Do.
Webster	Roy Orsburn, M. D.	Dixon	Do.
Whitley	M. W. Steele, M. D.	Corbin	Do.
Wolfe	John L. Cox, M. D.	Campton	Do.
Louisiana:[1]			
Assumption	P. M. Payne, M. D.	Napoleonville	Parish health officer.
Avoyelles	R. W. Todd, M. D.	Marksville	Do.
Caddo	W. J. Sandidge, M. D.	Shreveport	Do.
Caldwell	Thomas Burke, M. D.	Columbia	Director of health.
Catahoula	C. T. Richardson, M. D.	Harrisonburg	Do.
Claiborne	H. R. Marlatt, M. D.	Homer	Do.
Concordia	John Schreiber, M. D.	Vidalia	Do.
De Soto	R. A. Tharp, M. D.	Mansfield	Parish health officer.
East Carroll		Lake Providence	Director of health.
Franklin	R. E. Applewhite, M. D.	Winnsboro	Do.
Iberia	B. L. Stinson, M. D.	New Iberia	Parish health officer.
Iberville	J. Cyril Eby, M. D.	Plaquemine	Director of health.
Lafayette	R. S. Hernandez, M. D.	Lafayette	Do.
Lafourche	H. S. Smith, M. D.	Thibodaux	Parish health officer.
La Salle	P. J. Peniston, M. D.	Jena	Director of health.
Lincoln	R. H. Allen, M. D.	Ruston	Do.
Madison	T. G. Scott, M. D.	Tallulah	Do.
Morehouse	N. P. Niles, M. D.	Bastrop	Do.
Natchitoches	W. W. Knipmeyer, M. D.	Natchitoches	Parish health officer.
Ouachita	John W. Williams, M. D.	Monroe	Do.
Pointe Coupee	F. F. Rougon, M. D.	New Roads	Do.
Rapides	Edmond Klamke, M. D.	Alexandria	Do.
Richland	H. H. Purinton, M. D.	Rayville	Director of health.
St. Landry	C. W. Olson, M. D.	Opelousas	Do.
St. Martin			
St. Mary	L. R. Craig, M. D.	Franklin	Parish health officer.
Tensas	G. D. Williams, M. D.	St. Joseph	Director of health.
Terrebonne	Jos. Raphiel, M. D.	Houma	Do.
Washington	F. A. Williams, M. D.	Franklinton	Do.
Webster	W. C. Sumner, M. D.	Minden	Do.
West Carroll	W. L. Stone, M. D.	Oak Grove	Do.

[1] Parishes.

State and county	Name of health officer	Post-office address	Official title
Maine:			
Motbov Union [3]	H. L. Jackson, M. D	Old Town	
Rumford [4]	Thomas S. Barr, M. D	Rumford	
Sanford [4]	W. H. Kelly, M. D	Sanford	
Vassalboro [4]	A. R. Daviau, M. D	Vassalboro	
Maryland:			
Alleghany	J. P. Franklin, M. D	Cumberland	County health officer.
Baltimore	J. S. Bowen, M. D	Towson	Do.
Calvert	I. N. King, M. D	Prince Frederick	Do.
Carroll	W. C. Stone, M. D	Westminster	Do.
Cecil	C. A. Kane, M. D	Elkton	Do.
Frederick	E. C. Kefauver, M. D	Frederick	Do.
Harford	C. A. Callahan, M. D	Bel Air	Do.
Montgomery	W. T. Pratt, M. D	Rockville	Do.
Prince Georges	W. S. Keister, M. D	Upper Marlboro	Do.
Talbot	A. L. Oilar, M. D	Easton	Do.
Wicomico	Seth H. Hurdle, M. D	Salisbury	Do.
Massachusetts:			
Barnstable	A. P. Goff, M. D	Hyannis	Do
Michigan:			
Genesee	Charles L. Lambert, M. D	Flint	Health officer.
Oakland	John D. Monroe, M. D	Pontiac	Health commissioner.
Saginaw	Frank L. Rose, M. D	Saginaw	Health officer.
Wexford	Sair C. Moore, M. D	Cadillac	Health commissioner.
Minnesota:			
St. Louis	G. J. Ferreira, M. D	Duluth	County health officer.
Mississippi:			
Adams	Loren Wallin, M. D	Natchez	Director of health.
Bolivar	R. D. Dedwylder, M. D	Cleveland	Do.
Clarke	D. S. Johnson, M. D	Quitman	Do.
Coahoma	D. V. Galloway, M. D	Clarksdale	Do.
Copiah	J. A. Milne, M. D	Hazlehurst	Do.
Forrest	W. D. Beacham, M. D	Hattiesburg	Do.
Hancock	C. M. Shipp, M. D	Bay St. Louis	Do.
Harrison	Daniel J. Williams, M. D	Gulfport	Health officer.
Hinds	W. E. Noblin, M. D	Jackson	Director of health.
Holmes	T. Paul Haney, jr., M. D	Lexington	Do.
Humphreys	W. W. Scott, M. D	Belzoni	Do.
Issaquena	A. K. Barrier, M. D	Rolling Fork	Do.
Jackson	R. G. Lauder, M. D	Pascagoula	Do.
Lamar	W. H. Cleveland, M. D	Purvis	Do.
Lauderdale	J. T. Googe, M. D	Meridian	Do.
Lee	C. St. C. Guild, M. D	Tupelo	Do.
Leflore	C. P. Google, M. D	Greenwood	Do.
Lincoln	W. R. May, M. D	Brookhaven	Do.
Monroe	C. H. Love, M. D	Aberdeen	Do.
Pearl River	G. E. Godman, M. D	Poplarville	Do.
Perry	B. T. Robinson, M. D	New Augusta	Do.
Sharkey	A. K. Barrier, M. D	Rolling Fork	Do.
Sunflower	J. H. Janney, M. D	Indianola	Do.
Tishomingo	J. W. Barkley, M. D	Iuka	Do.
Union	L. A. Barnett, M. D	New Albany	Do.
Warren	F. Michael Smith, M. D	Vicksburg	Do.
Washington	J. W. Shackelford, M. D	Greenville	Do.
Yazoo	Hugh L. McCalip, M. D	Yazoo City	Do.
Missouri:			
Boone	Finis Suggett, M. D	Columbia	Health officer.
Buchanan	W. S. Hull, M. D	St. Joseph	Do.
Dunklin	Wheeler Davis, M. D	Kennett	Do.
Greene	J. W. Williams, M. D	Springfield	Do.
Jackson	Joseph T. Brennan, M. D	Independence	Do.
Marion	E. M. Lucke, M. D	Hannibal	Do.
Mississippi	E. Chas. Rowling, M. D	Charleston	Do.
New Madrid	Wm. N. O'Bannon, M. D	New Madrid	Do.
Nodaway	C. P. Fryer, M. D., D. P. H.	Maryville	Do.
Pemiscot	Fred Ogilvie, M. D	Caruthersville	Do.
St. Francois	W. W. Johnston, M. D	Flat River	Do.
St. Louis	Louis Obrock, M. D	Clayton	Do.
Scott	U. P. Haw, M. D	Benton	Do.
Montana:			
Cascade	Thomas F. Walker, M. D	Great Falls	Do.
Gallatin	A. D. Brewer, M. D	Bozeman	Do.
Lewis and Clark	A. Jordan, M. D	Helena	Do.
Missoula	F. D. Pease, M. D	Missoula	Do.
New Mexico:			
Bernalillo	J. R. Scott, M. D	Albuquerque	County health officer.
Chaves			Do.
Dona Ana	C. W. Gerber, M. D	Las Cruces	Do.
Eddy	O. E. Puckett, M. D	Carlsbad	Do.
McKinley			Do.
Union	H. M. Batson, M, D	Clayton	Do.
Valencia	P. H. McNellis, M. D	Los Lunas	Do.

[3] District. [4] Town.

State and county	Name of health officer	Post-office address	Official title
New York:			
Cattaraugus	R. M. Atwater, M. D., Dr. P. H.	Olean	Health officer.
Cortland	Daniel R. Reilly, M. D.	Cortland	County health officer.
Suffolk	Arthur T. Davis, M. D.	Riverhead	Do.
Westchester	Matthias Nicoll, jr., M. D.	White Plains	Do.
North Carolina:			
Beaufort	R. E. Windley, M. D.	Washington	Health officer.
Bertie	J. E. Smith, M. D.	Windsor	Do.
Bladen	R. S. Cromartie, M. D.	Elizabethtown	Do.
Buncombe	R. E. Fox, M. D.	Asheville	Do.
Cabarrus	D. G. Caldwell, M. D.	Concord	Do.
Cherokee	W. C. Morrow, M. D.	Murphy	Do.
Columbus	Floyd Johnson, M. D.	Whiteville	Do.
Craven	D. E. Ford, M. D.	New Bern	Do.
Cumberland	L. L. Williams, M. D.	Fayetteville	Do.
Davidson	G. C. Gambrell, M. D.	Lexington	Do.
Durham	J. H. Epperson, Ph. D.	Durham	Do.
Edgecomb	R. E. Broadway, M. D.	Tarboro	Do.
Forsythe	J. R. Hege, M. D.	Winston-Salem	Do.
Gaston	R. E. Rhyne, M. D.	Gastonia	Do.
Granville	J. A. Morris, M. D.	Oxford	Do.
Guilford	R. M. Buie, M. D.	Greensboro	Do.
Halifax	Z. P. Mitchell, M. D.	Weldon	Do.
Henderson	J. H. Woodcock, M. D.	Hendersonville	Do.
Johnston	C. C. Murray, M. D.	Smithfield	Do.
Lenoir	R. S. McGeachy, M. D.	Kinston	Do.
Mecklenburg	W. A. McPhaul, M. D.	Charlotte	Do.
Moore	J. Symington, M. D.	Carthage	Do.
Nash	G. F. Reeves, M. D.	Nashville	Do.
New Hanover	J. H. Hamilton, M. D.	Wilmington	Do.
Northampton	M. H. Seawell, M. D.	Jackson	Do.
Pitt	Clem Ham, M. D.	Greenville	Do.
Randolph	G. H. Sumner, M. D.	Asheboro	Do.
Richmond	A. B. McCreary, M. D.	Rockingham	Do.
Robeson	E. R. Hardin, M. D.	Lumberton	Do.
Rowan	C. W. Armstrong, M. D.	Salisbury	Do.
Rutherford	J. C. Twitty, M. D.	Rutherfordton	Do.
Sampson	John D. Kerr, M. D.	Clinton	Do.
Surry	M. T. Foster, M. D.	Mount Airy	Do.
Vance	F. R. Harris, M. D.	Henderson	Do.
Wake	A. C. Bulla, M. D.	Raleigh	Do.
Wayne	L. W. Corbett, M. D.	Goldsboro	Do.
Wilkes	J. W. White, M. D.	Wilkesboro	Do.
Wilson	L. J. Smith, M. D.	Wilson	Do.
Ohio:			
Allen	J. J. Sutter, M. D.	Lima	Health commissioner.
Ashtabula	W. S. Weiss, M. D.	Jefferson	Do.
Belmont	F. R. Dew, M. D.	St. Clairsville	Do.
Butler	C. J. Baldridge, M. D.	Hamilton	Do.
Clinton	W. K. Ruble, M. D.	Wilmington	Do.
Columbiana	T.T. Church, M. D.	Lisbon	Do.
Coshocton	D. M. Criswell, M. D.	Coshocton	Do.
Cuyahoga	Robert Lockhart, M. D.	Cleveland	Do.
Crawford	G. T. Wasson, M. D.	Bucyrus	Do.
Darke	W. D. Bishop, M. D.	Greenville	Do.
Delaware	B. B. Barber, M. D.	Delaware	Do.
Erie	F. M. Houghtaling, M. D	Sandusky	Do.
Fayette	J. F. Wilson, M. D.	Washington C. H.	Do.
Franklin	P. B. Wiltberger, M. D.	Columbus	Do.
Geauga	Walter Corey, M. D.	Chardon	Do.
Hamilton	C. R. Campbell, M. D.	Cincinnati	Do.
Hancock	S. F. Whisler, M. D.	Findlay	Do.
Hocking	M. W. Bland, M. D.	Logan	Do.
Huron	B. C. Pilkey, M. D.	Norwalk	Do.
Jefferson	J. P. Young, M. D.	Steubenville	Do.
Lake	Walter Corey, M. D.	Painesville	Do.
Lorain	C. D. Barrett, M. D.	Oberlin	Do.
Lucas	F. F. De Vore, M. D.	Toledo	Do.
Mahoning	J. F. Elder, M. D.	Youngstown	Do.
Marion	N. Sifritt, M. D.	Marion	Do.
Meigs	Mrs. J. N. Gilliford, M. D.	Pomeroy	Do.
Mercer	F. E. Ayers, M. D.	Celina	Do.
Miami	E. R. Hiatt, M. D.	Troy	Do.
Montgomery	H. H. Pansing, M. D.	Dayton	Do.
Morrow	R. L. Pierce, M. D.	Mt. Gilead	Do.
Perry	F. J. Crosbie, M. D.	New Lexington	Do.
Pickaway	A. L. Stump, M. D.	Circleville	Do.
Preble	J. I. Nisbet, M. D.	Eaton	Do.
Richland	T. R. Meyer, M. D.	Mansfield	Do.
Ross	R. E. Bower, M. D.	Chillicothe	Do.
Sandusky	O. H. Thomas, M. D.	Fremont	Do.
Scioto	R. W. De Crow, M. D.	Portsmouth	Do.
Seneca	J. J. Heaton, M. D.	Tiffin	Do.
Shelby	B. S. Stephenson, M. D.	Sidney	Do.

State and county	Name of health officer	Post-office address	Official title
Ohio—Continued.			
Stark	C. M. Peters, M. D.	Canton	Health commissioner.
Summit	R. H. Markwith, M. D.	Akron	Do.
Trumbull	L. A. Connell, M. D.	Warren	Do.
Tuscarawas	J. Blickensderfer, M. D.	New Philadelphia	Do.
Washington	A. G. Sturgiss, M. D.	Marietta	Do.
Wayne	W. G. Rhoten, M. D.	Wooster	Do.
Wood	H. J. Powell, M. D.	Bowling Green	Do.
Oklahoma:			
Carter	John L. Dorough, M. D.	Ardmore	County superintendent of health.
Le Flore	W. F. Lunsford, M. D.	Poteau	Do.
McCurtain	R. D. Williams, M. D.	Idabel	Do.
Muskogee	G. S. Atkinson, M. D.	Muskogee	Do.
Okmulgee	J. O. Wails, M. D.	Okmulgee	Do.
Osage	H. L. Wright, M. D.	Pawhuska	Do.
Ottawa	F. P. Helm, M. D.	Miami	Do.
Seminole	George Hunter, M. D.	Wewoka	Do.
Pittsburg	Chas. M. Pearce, M. D.	McAlester	Do.
Oregon:			
Clackamas	W. H. Miller, M. D.	Oregon City	County health officer.
Coos	P. M. Drake, M. D.	Coquille	Do.
Douglas	B. R. Shoemaker, M. D.	Roseburg	Do.
Jackson	B. C. Wilson, M. D.	Medford	Do.
Klamath	G. S. Newsom, M. D.	Klamath Falls	Do.
Marion	Vernon Douglas, M. D.	Salem	Do.
Multnomah	H. R. Cliff, M. D.	Portland	Do.
South Carolina:			
Aiken	W. G. Bodie, M. D.	Aiken	Health officer.
Anderson	E. E. Epting, M. D.	Anderson	Do.
Beaufort	H. B. Senn, M. D.	Beaufort	Do.
Berkeley	T. B. Harper, M. D.	Moncks Corner	Do.
Charleston	Leon Banov, M. D.	Charleston	Do.
Cherokee	E. P. White, M. D.	Gaffney	Do.
Darlington	A. B. Hooton, M. D.	Darlington	Do.
Dillon	G. E. McDaniel, M. D.	Dillon	Do.
Dorchester	A. R. Johnston, M. D.	St. George	Do.
Fairfield	J. L. Bryson, M. D.	Winnsboro	Do.
Florence	J. G. McMaster, M. D.	Florence	Do.
Georgetown	S. S. Simons, M. D.	Georgetown	Do.
Greenville	Baylis Earle, M. D.	Greenville	Do.
Greenwood	J. E. Brodie, M. D.	Greenwood	Do.
Horry	H. F. Wilson, M. D.	Conway	Do.
Kershaw	A. W. Humphries, M. D.	Camden	Do.
Lexington	G. R. Westrope, M. D.	Lexington	Do.
Marion	B. M. Montgomery, M. D.	Marion	Do.
Newberry	H. G. Callison, M. D.	Newberry	Do.
Oconee	L. H. Jennings, M. D.	Walhalla	Do.
Orangeburg	G. C. Bolin, M. D.	Orangeburg	Do.
Richland	John B. Setzler, M. D.	Columbia	Do.
Spartanburg	J. Moss Beeler, M. D.	Spartanburg	Do.
South Dakota:			
Pennington	A. N. Crain, M. D.	Rapid City	Do.
Tennessee:			
Bledsoe	U. B. Bowden, M. D.	Pelham	Director of health.
Blount	K. A. Bryant, M. D.	Maryville	Do.
Bradley	H. M. Roberson, M. D.	Cleveland	Health officer.
Carter	W. W. King, M. D.	Elizabethton	Director of health.
Clay	F. B. Clark, M. D.	Gainsboro	Do.
Davidson	J. J. Lentz, M. D.	Nashville	Health officer.
Dyer	O. F. Agee, M. D.	Dyersburg	Do.
Fentress	E. W. Clark, M. D.	Livingston	Director of health.
Gibson	J. A. Crabtree, M. D.	Trenton	Health officer.
Giles	A. F. Barr, M. D.	Pulaski	Director of health.
Greene	R. S. Cowles, M. D.	Greeneville	Health officer.
Grundy	U. B. Bowden, M. D.	Pelham	Director of health.
Hamilton	J. C. Eldridge, M. D.	Chattanooga	Do.
Hardeman	R. L. Cobb, M. D.	Bolivar	Do.
Jackson	F. B. Clark, M. D.	Gainesboro	Do.
Knox	A. G. Hufstetler, M. D.	Knoxville	Do.
Lake	J. P. Moon, M. D.	Tiptonville	Do.
Lauderdale	R. B. Griffin, M. D.	Ripley	Do.
Lincoln	D. D. Howser, M. D.	Fayetteville	Do.
Meigs	J. B. White, M. D.	Dayton	Do.
Monroe	H. M. Kelso, M. D.	Madisonville	Do.
Montgomery	F. J. Malone, M. D.	Clarksville	Health officer.
Obion	J. W. Frost, M. D.	Union City	Do.
Overton	E. W. Clark, M. D.	Livingston	Director of health.
Pickett	do	do	Do.
Rhea	J. B. White, M. D.	Dayton	Do.
Roane	J. C. Fly, M. D.	Kingston	Health officer.
Rutherford	J. B. Black, M. D.	Murfreesboro	Do.
Sequatchie	U. B. Bowden, M. D.	Pelham	Director of health.
Sevier	C. P. Wilson, M. D.	Sevierville	Do.
Shelby	W. B. Harrison, M. D.	Memphis	Health officer.

State and county	Name of health officer	Post-office address	Official title
Tennessee—Contd.			
Sullivan	F. L. Moore, M. D.	Blountville	Director of health.
Sumner	G. M. Morris, M. D.	Gallatin	Do.
Tipton	A. J. Butler, M. D.	Covington	Do.
Washington	S. S. Moody, M. D.	Jonesboro	Do.
Weakley	M. D. Ingram, M. D.	Dresden	Health officer.
Williamson	W. C. Williams, M. D.	Franklin	Do.
Wilson	W. D. Cagle, M. D.	Lebanon	Director of health.
Texas:			
Cameron	R. J. Gillispie, M. D.	San Benito	County health officer.
Hidalgo	J. R. Mahone, M. D.	Edinburg	Do.
Jefferson	J. D. Blevins, M. D.	Beaumont	Do.
McLennan	W. F. Curran, M. D.	Waco	Do.
Nolan	M. H. Janson, M. D.	Sweetwater	Do.
Tarrant	T. C. Colley, M. D.	Fort Worth	Do.
Utah:			
Davis	Sumner Gleason, M. D.	Kaysville	Do.
Utah			Do.
Virginia:			
Accomac	C. J. Bradshaw, M. D.	Accomac	Health officer.
Albemarle	G. B. Young, M. D.	Charlottesville	Do.
Arlington	P. M. Chichester, M. D.	Clarendon	Do.
Augusta	H. M. Wallace, M.D.	Staunton	Do.
Brunswick	T. H. Valentine, M.D.	Lawrenceville	Do.
Greensville	do	do	Do.
Halifax	Kolbe Curtice	South Boston	Do.
Henrico	A. L. McLean, M.D.	Richmond	Do.
Isle of Wight	C. H. Dawson, M. D.	Suffolk	Do.
Nansemond	do	do	Do.
Norfolk	J. Leake, M. D.	Portsmouth	Do.
Northampton	C. J. Bradshaw, M. D.	Accomac	Do.
Princess Anne	J. Leake, M. D.	Portsmouth	Do.
Rockbridge	R. P. Cooke, M. D.	Lexington	Do.
Southampton	B. B. Bagby, M. D.	Courtland	Do.
Wise	W. R. Culbertson, M. D.	Norton	Do.
Washington:			
Chelan	Paul L. West, M. D.	Wenatchee	Do.
Clarke	Geo. H. T. Sparling, M. D.	Vancouver	Do.
King	C. L. Dixon, M. D.	Seattle	Do.
Snohomish	H. M. Berge, M. D.	Everett	Do.
Spokane	W. M. Newman, M. D.	Spokane	Do.
Walla Walla	J. E. Vanderpool, M. D.	Walla Walla	Do.
Whitman	R. J. Skaife, M. D.	Colfax	Do.
Yakima	H. Storgaard, M. D.	Yakima	Do.
West Virginia:			
Berkeley	W. Ross Cameron, M. D.	Martinsburg	Do.
Boone	A. M. Price, M. D.	Madison	Do.
Booke	W. J. MacDonald, M. D.	Wellsburg	Do.
Fayette	H. H. Puckett, M. D.	Fayetteville	Do.
Gilmer	T. E. Cato, M. D.	Glenville	Do.
Hancock	J. E. Fisher, M. D.	New Cumberland	Do.
Harrison	V. A. Selby, M. D., D. P. H.	Clarksburg	Do.
Kanawha	John Thames, M. D.	Charleston	Do.
Logan	V. A. Deason, M. D.	Logan	Do.
Marion	F. F. Sowers, M. D.	Fairmont	Do.
Monongalia	R. G. Farrier, M. D.	Morgantown	Do.
Ohio	W. H. McLain, M. D.	Wheeling	Do.
Preston	L. T. Browning, M. D.	Kingwood	Do.
Raleigh	A. E. Murphy, M. D.	Beckley	Do.
Wood	Arthur D. Knott, M. D.	Parkersburg	Do.

CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES[1]

November 2–29, 1930

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the Public Health Service is summarized below. The underlying statistical data are published weekly in the PUBLIC HEALTH REPORTS under the section entitled "Prevalence of disease."

[1] From the Office of Statistical Investigations, U. S. Public Health Service. The numbers of States included for the various diseases are as follows: Typhoid fever, 41; poliomyelitis, 35; meningococcus meningitis, 42; smallpox, 42; measles, 38; diphtheria, 42; scarlet fever, 41; influenza, 31.

Poliomyelitis.—The poliomyelitis incidence continues on a relatively high level. During the current 4-week period, 697 cases of poliomyelitis were reported, as compared with 1,641 cases during the preceding period. In an absolute sense the current period shows a marked decline in cases since the last period. This, however, is largely attributable to the seasonal decline which normally occurs at this time. It will be observed from the accompanying table that the current incidence was 4.9 times the incidence of the corresponding period of last year. During the preceding report period this ratio stood at 5.6. In relation to last year, therefore, the current incidence is still on a high level. In the far West, there are signs of a decided improvement in the situation. Elsewhere, the picture varies from region to region, as is seen in the table.

TABLE 1.—*Poliomyelitis, by geographical sections*

	Number of cases reported in 1929, 4 weeks ended—				Number of cases reported in 1930, 4 weeks ended—				Ratio of current incidence to that of corresponding 4 weeks of last year period ended—			
	Sept. 7	Oct. 5	Nov. 2	Nov. 30	Sept. 6	Oct. 4	Nov. 2	Nov. 29	Sept. 6	Oct. 4	Nov. 2	Nov. 29
North Atlantic [1]	155	190	129	51	320	449	382	124	2.1	2.4	3.0	2.4
South Atlantic	32	38	25	27	35	38	37	17	1.1	1.0	1.5	.6
East North Central	53	61	65	22	118	284	262	125	2.2	4.7	4.0	5.7
West North Central	16	30	39	11	358	659	571	207	22.4	22.0	14.6	18.8
South Central [2]	20	10	9	6	97	83	63	49	4.9	8.3	7.0	8.2
Mountain and Pacific	53	29	25	24	254	324	326	175	7.7	11.2	13.0	7.3
All regions	309	358	292	141	1,182	1,837	1,641	697	3.8	5.1	5.6	4.9

[1] Includes New England and Middle Atlantic groups.
[2] Includes East and West South Central groups.

Meningococcus meningitis.—During the current period, 319 cases were reported, i. e., approximately 70 per cent of the number for the corresponding period of last year. During the preceding period of this year 291 cases had been reported, or about 80 per cent of the reports for the corresponding period of 1929. In other words, the situation continues to improve in relation to the preceding year.

Scarlet fever.—The scarlet fever situation in most sections is slightly more favorable than it was last year, except in the north Atlantic group of States, where the number of cases, 4,537, is about one-eighth higher than last year. In the reporting area as a whole, 12,257 cases were reported, as compared with 13,391 during the corresponding period of last year.

Typhoid fever.—The excess of cases, which became pronounced about August of this year, has persisted into November. Reported cases during the current period numbered 1,913, compared with 1,242 during the corresponding period last year. The current incidence is relatively high in all regions except in the Great Lakes group of States, and in the Rocky Mountain and Pacific groups.

Smallpox.—The November period is highly favorable in comparison with recent years. During this period, 1,257 cases were reported,

compared with 3,097 for the period in 1929, and 1,655 in 1928. All regions except the South Atlantic participated in the decline.

Measles.—In most regions there were no marked changes from last year except on the North Atlantic Coast where the cases declined by about one-half. In the reporting area as a whole, cases for the current 4-week period were slightly below the corresponding 4-week period of last year.

Influenza.—The incidence continues comparatively low. During the current period 1,626 cases were reported, compared with 2,122 for the period last year.

Diphtheria.—The reported cases, 6,443, were at the lowest level for the period during the last five years. Last year 8,812 cases were reported during the corresponding period.

Mortality, all causes.—The mortality from all causes in large cities as reported in the Weekly Health Index of the Bureau of the Census, averaged 11.6 per 1,000 population, annual basis, for the current period. This is the lowest rate on record for this season. Last year, the corresponding period showed a rate of 11.8, and the year before 12.5.

DEATH RATES IN A GROUP OF INSURED PERSONS

Rates for Principal Causes of Death for October, 1930

The accompanying table, taken from the Statistical Bulletin for November, 1930, issued by the Metropolitan Life Insurance Co., presents the mortality record of the industrial insurance department of the company for October, 1930, as compared with that for the preceding month and for the corresponding month of last year. It also gives the cumulative rates for the period January–October for the years 1930 and 1929. These rates are based on a strength of approximately 19,000,000 insured persons in the United States and Canada.

The Bulletin says:

Unless a severe setback takes place in the last six weeks of 1930, the year is destined to be recorded as the best of all health years to date. Among Metropolitan Industrial policyholders living west of the Rocky Mountains, the improvement in the death rate for the first 10 months amounted to 5.8 per cent, as compared with the like part of 1929, and for those in the rest of the United States to 8.8 per cent. Canada, also, is enjoying unprecedentedly favorable health conditions. Among 1,250,000 Metropolitan Industrial policyholders in that country, the cumulative death rate at the end of October was 6.4 per cent lower than in the like part of last year. For the entire group of industrial policyholders the year-to-date death rate for the 10-month period was 8.7 per 1,000 as compared with 9.5 in 1929, a drop of 8.3 per cent. Reports recently received by the company indicate that health conditions have continued favorable for the first two weeks of November.

Health conditions during the month of October were better than the average for that month and showed marked improvement over October, 1929.

Death rates (annual basis) per 100,000 for principal causes of death, October, 1930

[Industrial department, Metropolitan Life Insurance Co.]

Causes of death	Rate per 100,000 lives exposed [1]				
	October, 1930	September, 1930	October, 1929	Cumulative, January–October	
				1930	1929
Total—all causes	810.3	782.8	852.7	873.3	952.6
Typhoid fever	4.4	4.1	3.6	2.2	2.4
Measles	.3	.6	.4	3.2	3.3
Scarlet fever	1.3	1.1	1.3	2.6	2.6
Whooping cough	2.7	4.6	3.8	4.5	6.1
Diphtheria	5.0	2.7	8.4	5.8	8.3
Influenza	6.7	5.5	9.2	14.7	46.0
Tuberculosis (all forms)	75.0	72.8	81.3	82.1	88.9
Tuberculosis of respiratory system	67.4	63.9	70.2	71.4	78.5
Cancer	82.4	78.9	78.1	77.2	77.5
Diabetes mellitus	16.9	15.8	17.0	18.3	18.7
Cerebral hemorrhage	55.7	54.5	[2] 56.6	59.7	[2] 57.0
Organic diseases of heart	130.4	121.6	130.7	143.7	148.4
Pneumonia (all forms)	46.5	34.5	54.1	75.7	91.3
Other respiratory diseases	9.2	8.8	10.6	11.1	12.3
Diarrhea and enteritis	38.5	40.2	32.3	21.0	21.9
Bright's disease (chronic nephritis)	61.9	59.1	68.1	67.4	70.1
Puerperal state	10.1	10.4	10.6	12.2	13.6
Suicides	10.0	9.5	8.6	9.6	8.7
Homicides	6.9	7.4	7.7	6.6	6.5
Other external causes (excluding suicides and homicides)	59.5	64.5	67.0	62.5	64.8
Traumatism by automobiles	23.4	23.7	26.2	20.2	19.9
All other causes	187.4	186.2	203.0	193.2	202.6

[1] All figures in this table include insured infants under 1 year of age. The rates for 1930 are subject to slight correction, since they are based on provisional estimates of lives exposed to risk.
[2] Rate not comparable with that for 1930.

COURT DECISION RELATING TO PUBLIC HEALTH

Birth and death registration law construed.—(Illinois Supreme Court; People ex rel. Arnd *v.* Heckard et al., 173 N. E. 124; decided October 25, 1930.) The relator, in a petition for mandamus, alleged that he had made written demand upon the county clerk of Cook County for certified copies of the death certificates of his two brothers, and that the county clerk had said that he could not comply with the demand because the registrar of vital statistics for the city of Chicago had not deposited any records of births or deaths with the county clerk since 1915. The prayer for the writ of mandamus was for the depositing with the county clerk of a complete set of the records of births, stillbirths, and deaths registered with the local registrar of Chicago since 1915. In its disposition of the case, the supreme court construed those provisions of the registration law (Smith-Hurd Revised Statutes, 1929, ch. 111½, secs. 36–57) which were involved, and the following excerpts from the court's opinion will show the construction placed by the court upon such provisions:

The statute thus makes the local registrar a receiving agent to receive the original birth and death certificates, to file them with the State board of health, and to file a copy with the county clerk, who is to keep the record for the entire county. The act does not require the local registrars or the cities to make and retain in their files any permanent record, although it permits the city to do so, at its option and at its own expense. * * *

From the wording of this act we believe that the first copy of the record of births and deaths made by the local registrar is the one required to be turned over by him to the county clerk, and that, in case the local registrar, or the city for which he is acting, desires another copy or copies for his permanent records, such city must make such copies for itself and at its own expense. * * * * * * Moreover, section 20, in requiring the local registrar to issue certified copies to all applicants, may be construed as applicable to local registrars only in the event the city has elected, in accordance with the provisions of section 18, to keep a permanent record for that purpose, which is made entirely optional with the city. * * *

Section 20 of the act, considered in the light of section 18 as now amended, has a double but not conflicting purpose. Under it the local registrar is required to issue certified copies on application so long as he has the records in his office—that is, in any event, during a current calendar month. Under section 20 the local registrar is also required to issue such certified copies to any applicant at any time, if, as permitted by section 18, the city shall have made extra copies as its permanent record, which, as previously stated, was left optional with the city. In view of the foregoing, there is no irreconcilable conflict between section 20 and section 18, even if the latter section be construed as requiring the registrar to file with the county clerk the first and only copy he makes of the records.

* * * * * * *

It is apparent from the foregoing that the local registrar is required to furnish monthly to the county clerk a record of the births and deaths of the preceding month, and neither the registrar, nor the city constituting the registration district for which the registrar is acting, is entitled to any compensation therefor, either under the act or otherwise, until the end of the calendar year, at which time, if the local registrar has turned over the original certificates to the State board of health and has turned over copies of the certificates to the county clerk, it becomes the duty of the State board of health to certify to the county clerk the fees due and payable by the county to the registrar or the city. It is then for the first time that the county clerk, or other county officer by whom warrants on the county treasurer are issued, is required to issue to the local registrar his warrant upon the county treasurer for the amount of the fees due the registrar under the act, and thereupon the county treasurer is required to pay the same upon presentation. * * *

As to the right of the relator, the court said:

The failure of defendants to comply with the above-mentioned statutory requirements is not disputed. They have not filed certified copies of the records of births, stillbirths, and deaths in the county clerk's office, as required by law. Nor is there any doubt under the existing circumstances but that the relator and the public generally have a clear legal right for which mandamus is an appropriate remedy.

DEATHS DURING WEEK ENDED NOVEMBER 29, 1930

Summary of information received by telegraph from industrial insurance companies for the week ended November 29, 1930, and corresponding week of 1929. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)

	Week ended Nov. 29, 1930	Corresponding week, 1929
Policies in force	75, 166, 430	75, 202, 228
Number of death claims	11, 701	11, 704
Death claims per 1,000 policies in force, annual rate	8. 1	8. 1

Deaths [1] from all causes in certain large cities of the United States during the week ended November 29, 1930, infant mortality, annual death rate, and comparison with corresponding week of 1929. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)

[The rates published in this summary are based upon mid-year population estimates derived from the 1930 census. The rates are not exactly comparable with similar rates published in the Public Health Reports earlier than the issue of August 22, 1930, which were based upon estimates made before the 1930 census was taken]

City	Week ended Nov. 29, 1930				Corresponding week 1929		Death rate [2] for first 48 weeks	
	Total deaths	Death rate [2]	Deaths under 1 year	Infant mortality rate [3]	Death rate [2]	Deaths under 1 year	1930	1929
Total (78 cities)	7,112	10.7	642	51	12.1	683	11.9	12.6
Akron	29	5.9	5	46	9.9	8	7.9	9.4
Albany [4]	29	11.8	3	62	17.7	2	14.8	16.3
Atlanta	47	9.1	2	20	14.3	10	15.5	15.9
White	19		1	16		8		
Colored	28	(6)	1	29	(6)	2	(6)	(6)
Baltimore [4]	187	12.1	19	66	16.4	18	14.0	14.6
White	138		14	62		14		
Colored	49	(6)	5	80	(6)	4	(6)	(6)
Birmingham	64	12.9	2	19	15.1	9	13.7	15.9
White	36		0	0		3		
Colored	28	(6)	2	49	(6)	6	(6)	(6)
Boston	204	13.6	31	90	13.6	18	14.1	14.9
Bridgeport	19	6.7	1	17	11.7	6	10.8	12.0
Buffalo	127	11.5	14	62	14.2	14	12.9	14.0
Cambridge	25	11.5	1	20	17.5	2	11.8	12.6
Camden	34	15.1	3	53	9.4	2	13.7	14.3
Canton	14	6.9	1	27	12.5	1	9.8	11.2
Chicago [4]	641	9.9	50	44	10.9	89	10.4	11.3
Cincinnati	119	13.8	8	47	16.1	12	15.6	17.0
Cleveland	160	9.2	9	27	10.8	22	11.0	12.3
Columbus	77	13.8	7	69	12.6	7	15.5	14.7
Dallas	55	10.9	9		11.9	4	11.5	11.5
White	43		7			2		
Colored	12	(6)	2		(6)	2	(6)	(6)
Dayton	35	9.1	2	30	8.2	3	10.7	11.5
Denver	77	13.9	10	109	14.4	8	14.9	14.8
Des Moines	20	7.3	4	74	12.9	7	11.6	11.5
Detroit	266	8.8	30	46	9.1	33	9.3	11.1
Duluth	15	7.7	2	54	9.8	1	11.4	11.5
El Paso	22	11.2	3		22.8	10	17.0	19.6
Erie	22	9.9	1	22	9.5	4	11.2	12.0
Fall River [4] [7]	26	11.9	2	46	10.9	2	11.7	13.6
Flint	14	4.6	1	12	11.7	7	9.1	10.7
Fort Worth	28	9.0	4		12.5	2	11.0	12.3
White	24		4			2		
Colored	4	(6)	0		(6)	0	(6)	(6)
Grand Rapids	32	9.9	2	30	11.6	5	10.1	10.3
Houston	63	11.2	12		16.0	5	12.2	12.6
White	44		6			3		
Colored	19	(6)	6		(6)	2	(6)	(6)
Indianapolis	85	12.1	4	30	13.0	0	14.5	14.8
White	72		4	35		0		
Colored	13	(6)	0	0	(6)	0	(6)	(6)
Jersey City	64	10.6	10	87	12.8	7	11.4	12.4
Kansas City, Kans	26	11.1	4	93	10.7	2	11.7	12.8
White	19		4	110		1		
Colored	7	(6)	0	0	(6)	1	(6)	(6)
Kansas City, Mo	79	10.4	2	17	15.2	6	13.4	14.0
Knoxville	30	14.7	0	0	13.6	3	13.6	13.9
White	20		0	0		3		
Colored	10	(6)	0	0	(6)	0	(6)	(6)
Los Angeles	267	11.2	21	63	11.6	17	11.0	11.3
Louisville	58	9.8	5	43	14.9	5	13.5	15.1
White	47		5	49		4		
Colored	11	(6)	0	0	(6)	1	(6)	(6)
Lowell [7]	20	10.4	2	53	9.3	1	13.4	14.0
Lynn	13	6.6	0	0	14.3	1	10.3	11.2
Memphis	80	16.5	10	118	24.7	9	17.0	18.9
White	36		3	54		5		
Colored	44	(6)	7	235	(6)	4	(6)	(6)
Milwaukee	93	8.5	16	70	8.0	11	9.7	10.9
Minneapolis	87	9.8	5	33	10.7	5	10.7	10.8

See footnotes at end of table.

Deaths from all causes in certain large cities of the United States during the week ended November 29, 1930, infant mortality, annual death rate, and comparison with corresponding week of 1929. (From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended Nov. 29, 1930				Corresponding week 1929		Death rate for first 48 weeks	
	Total deaths	Death rate	Deaths under 1 year	Infant mortality rate	Death rate	Deaths under 1 year	1930	1929
Nashville	45	15.9	8	126	16.7	4	17.3	18.6
White	32		7	147		2		
Colored	13	(6)	1	62	(6)	2	(6)	(6)
New Bedford [7]	27	12.5	3	77	8.7	6	11.0	12.0
New Haven	32	10.3	2	31	13.5	1	12.7	13.5
New Orleans	119	13.6	23	128	19.5	15	17.4	17.6
White	82		16	135		6		
Colored	37	(6)	7	113	(6)	9	(6)	(6)
New York	1,287	9.6	101	42	9.9	105	10.7	11.2
Bronx Borough	171	7.0	12	35	6.9	12	7.8	8.2
Brooklyn Borough	465	9.3	39	41	9.1	41	9.7	10.2
Manhattan Borough	497	14.0	43	55	13.9	38	16.0	16.3
Queens Borough	119	5.7	6	24	7.4	13	7.0	7.6
Richmond Borough	35	11.5	1	19	13.5	1	14.0	15.8
Newark, N. J.	83	9.7	9	47	13.2	13	11.9	12.6
Oakland	62	11.3	4	50	13.8	3	11.0	11.3
Oklahoma City	67	18.9	7	126	9.8	3	10.9	10.8
Omaha	52	12.6	3	36	14.2	2	13.6	13.6
Paterson	27	10.2	1	17	15.9	5	12.1	13.3
Philadelphia	398	10.6	32	48	11.2	28	12.5	13.1
Pittsburgh	162	12.6	15	53	14.2	10	13.8	14.8
Portland, Oreg.	63	10.9	1	12	11.8	6	12.2	12.7
Providence	61	12.7	7	65	14.2	4	12.9	14.4
Richmond	38	10.8	2	29	14.0	7	14.8	16.2
White	25		1	22		3		
Colored	13	(6)	1	43	(6)	4	(6)	(6)
Rochester	58	9.3	3	27	12.6	7	11.7	12.3
St. Louis	179	11.3	14	49	13.7	6	14.0	14.6
St. Paul	51	9.8	3	30	13.4	3	10.1	10.5
Salt Lake City [8]	27	10.0	6	95	13.2	3	12.5	13.0
San Antonio	54	11.0	8		18.9	13	14.4	14.6
San Diego	52	18.1	3	63	15.7	1	14.4	15.0
San Francisco	170	14.1	3	20	12.4	5	13.2	13.0
Schenectady	19	10.3	2	62	8.2	0	11.1	12.1
Seattle	79	11.3	4	40	9.3	5	10.9	11.2
Somerville	15	7.5	2	63	10.1	0	9.6	9.2
Spokane	22	9.9	2	52	13.6	3	12.4	12.7
Springfield, Mass.	36	12.5	2	34	11.9	3	12.1	12.6
Syracuse	47	11.8	7	86	16.5	3	11.7	12.9
Tacoma	26	12.7	3	82	13.7	1	12.5	11.8
Toledo	54	9.7	5	46	13.9	9	12.6	13.7
Trenton	25	10.6	3	58	11.1	1	16.5	16.9
Utica	17	8.6	2	56	13.8	1	14.6	15.4
Washington, D. C.	152	16.3	11	64	16.3	14	15.2	15.3
White	96		4	35		6		
Colored	56	(6)	7	125	(6)	8	(6)	(6)
Waterbury	17	8.7	5	122	7.8	4	9.3	9.4
Wilmington, Del. [7]	36	17.9	4	96	17.3	3	14.6	13.9
Worcester	39	10.3	5	69	13.6	3	12.6	12.6
Yonkers	30	11.5	7	167	8.7	3	8.1	9.3
Youngstown	31	9.5	3	43	15.0	2	10.4	12.3

[1] Deaths of nonresidents are included. Stillbirths are excluded.

[2] These rates represent annual rates per 1,000 population, as estimated for 1930 and 1929 by the arithmetical method.

[3] Deaths under 1 year of age per 1,000 live births. Cities left blank are not in the registration area for births.

[4] Data for 73 cities.

[5] Deaths for week ended Friday.

[6] For the cities for which deaths are shown by color the colored population in 1920 constituted the following percentages of the total population: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Forth Worth, 14; Houston, 25; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Louisville, 17; Memphis, 38; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

[7] Population Apr. 1, 1930; decreased 1920 to 1930; no estimate made.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended December 6, 1930, and December 7, 1929

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended December 6, 1930, and December 7, 1929

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929
New England States:								
Maine	3	4	----	12	23	10	0	1
New Hampshire	5	----	----	----	19	43	0	1
Vermont	2	2	----	----	1	6	0	0
Massachusetts	69	134	5	5	230	106	4	4
Rhode Island	7	10	----	----	2	3	1	1
Connecticut	18	25	1	3	89	9	4	1
Middle Atlantic States:								
New York	132	184	[1] 7	[1] 34	167	273	17	17
New Jersey	84	174	14	5	147	72	2	3
Pennsylvania	133	202	----	----	465	416	5	10
East North Central States:								
Ohio	51	91	4	8	73	295	2	3
Indiana	59	47	11	----	161	18	9	1
Illinois	160	257	21	29	129	392	7	8
Michigan	51	146	2	2	55	138	1	15
Wisconsin	12	31	25	21	148	253	2	1
West North Central States:								
Minnesota	18	26	----	1	12	149	0	1
Iowa	8	13	----	----	4	107	1	1
Missouri	43	39	3	7	492	37	1	9
North Dakota	12	10	----	----	3	7	0	1
South Dakota	10	6	----	1	1	16	0	1
Nebraska	17	22	3	7	3	105	2	2
Kansas	27	29	2	----	10	76	0	3
South Atlantic States:								
Delaware	3	2	----	----	1	----	0	0
Maryland [2]	38	38	13	22	6	9	1	1
District of Columbia	15	12	----	----	3	----	2	1
West Virginia	30	33	43	15	9	28	1	2
North Carlonia	107	152	10	11	20	2	4	3
South Carolina	33	48	629	956	----	----	1	0
Georgia	18	22	72	133	36	12	4	0
Florida	15	14	3	1	26	7	0	1

[1] New York City only.

[2] Week ended Friday.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended December 6, 1930, and December 7, 1929—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929
East South Central States:								
Kentucky	---	31	---	---	---	87	2	0
Tennessee	29	22	54	61	13	16	5	3
Alabama	70	67	31	94	42	14	6	0
Mississippi	35	47	---	---	---	---	0	0
West South Central States:								
Arkansas	19	12	15	92	1	---	0	7
Louisiana	20	56	15	36	4	8	2	1
Oklahoma [1]	61	84	47	116	44	39	0	9
Texas	121	127	52	30	44	2	1	2
Mountain States:								
Montana	1	4	---	---	3	73	0	4
Idaho	---	---	---	---	18	50	0	2
Wyoming	---	4	---	1	---	2	0	0
Colorado	9	15	---	---	23	12	2	4
New Mexico	18	6	2	1	26	7	2	1
Arizona	5	16	7	24	49	2	0	12
Utah [2]	---	2	6	3	2	5	3	0
Pacific States:								
Washington	32	13	18	---	17	35	3	1
Oregon	9	7	15	11	20	41	0	2
California	57	86	63	69	255	184	8	9

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929
New England States:								
Maine	1	0	19	34	0	0	18	3
New Hampshire	0	0	4	7	0	0	1	0
Vermont	0	0	7	1	1	1	1	0
Massachusetts	5	2	204	235	0	0	5	10
Rhode Island	0	0	18	16	0	0	0	1
Connecticut	1	0	57	66	0	0	8	4
Middle Atlantic States:								
New York	8	4	468	325	6	7	28	15
New Jersey	1	2	119	171	0	0	6	4
Pennsylvania	1	3	379	322	0	5	15	20
East North Central States:								
Ohio	16	7	473	232	46	154	31	9
Indiana	1	0	216	160	47	170	12	2
Illinois	9	0	304	564	43	107	19	14
Michigan	5	2	209	268	29	78	18	6
Wisconsin	4	1	83	139	8	36	5	9
West North Central States:								
Minnesota	7	0	61	100	15	8	1	1
Iowa	2	1	50	93	21	78	3	9
Missouri	2	0	90	102	9	30	5	2
North Dakota	1	0	17	26	5	4	4	1
South Dakota	5	0	7	24	17	27	0	0
Nebraska	5	1	44	39	63	29	2	0
Kansas	5	0	63	85	53	44	14	10
South Atlantic States:								
Delaware	1	0	14	1	0	0	1	0
Maryland [2]	1	0	79	77	0	0	7	9
District of Columbia	0	0	20	11	0	0	0	0
West Virginia	0	0	58	58	18	22	19	12
North Carolina	1	3	109	97	0	7	3	9
South Carolina	0	3	20	44	3	0	11	0
Georgia	1	1	56	25	0	0	8	1
Florida	0	0	12	12	0	1	2	1
East South Central States:								
Kentucky	2	1	71	87	0	0	20	5
Tennessee	0	3	58	45	3	4	11	9
Alabama	0	1	82	37	0	0	5	7
Mississippi	1	0	22	19	10	0	16	5

[1] Week ended Friday.

[2] Figures for 1930 are exclusive of Oklahoma City and Tulsa.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended December 6, 1930, and December 7, 1929—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929	Week ended Dec. 6, 1930	Week ended Dec. 7, 1929
West South Central States:								
Arkansas	0	0	16	32	8	3	25	6
Louisiana	0	0	18	22	3	1	15	3
Oklahoma [2]	0	0	44	99	20	66	32	17
Texas	4	0	80	48	45	14	8	2
Mountain States:								
Montana	0	0	41	53	16	26	0	5
Idaho	0	0	6	17	0	18	0	0
Wyoming	0	0	1	4	0	18	0	1
Colorado	0	0	11	23	29	5	1	4
New Mexico	2	0	13	9	0	0	5	8
Arizona	0	0	2	8	0	0	1	8
Utah [1]	0	0	6	7	0	0	1	0
Pacific States:								
Washington	2	0	51	45	32	51	5	6
Oregon	2	1	8	33	30	11	3	2
California	12	2	99	349	36	29	12	4

[1] Week ended Friday. [2] Figures for 1930 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
October, 1930										
California	16	284	131	3	500	5	364	372	72	77
New Hampshire	----	15	----	----	----	----	9	25	----	4
South Carolina	[1] 1	386	1,060	3,859	8	318	3	107	2	151
November, 1930										
Connecticut	6	48	15	----	296	----	7	147	0	18
Nebraska	5	57	13	----	25	----	47	100	84	4
Wyoming	1	3	----	----	1	----	7	21	0	2

[1] Report of 148 cases of meningococcus meningitis in South Carolina during August, published in Public Health Reports dated Oct. 10, 1930, was in error, later report showing only 3 cases.

October, 1930

	Cases
Actinomycosis:	
California	2
Anthrax:	
California	3
Chicken pox:	
California	749
South Carolina	28
Dengue:	
South Carolina	16
Diarrhea:	
South Carolina	502
Dysentery:	
California (amebic)	2
California (bacillary)	18
South Carolina	1
Food poisoning:	
California	12
German measles:	
California	36
Granuloma, coccidioidal:	
California	2
Hookworm disease:	
California	1
South Carolina	119
Jaundice:	
California	1
Leprosy:	
California	1
Lethargic encephalitis:	
California	5
South Carolina	4
Mumps:	
California	603
South Carolina	30
Ophthalmia neonatorum:	
California	1
South Carolina	13
Paratyphoid fever:	
California	2
South Carolina	6

	Cases
Rabies in animals:	
California	73
South Carolina	10
Tetanus:	
California	7
South Carolina	3
Trachoma:	
California	19
Trichinosis:	
California	5
Tularaemia:	
California	2
Undulant fever:	
California	10
Whooping cough:	
California	448
South Carolina	118

November, 1930

Chicken pox:	
Connecticut	304
Nebraska	240
Wyoming	79
Conjunctivitis:	
Connecticut	1
Lethargic encephalitis:	
Connecticut	5
Mumps:	
Connecticut	135
Nebraska	26
Wyoming	11
Paratyphoid fever:	
Connecticut	1
Rabies in animals:	
Connecticut	3
Septic sore throat:	
Connecticut	9
Nebraska	7
Trachoma:	
Connecticut	1
Trichinosis:	
Connecticut	1
Undulant fever:	
Connecticut	2
Whooping cough:	
Connecticut	185
Nebraska	33
Wyoming	33

Cases of certain communicable diseases reported for the month of July, 1930, by State health officers

State	Chicken pox	Diphtheria	Measles	Mumps	Scarlet fever	Smallpox	Tuberculosis	Typhoid and paratyphoid fever	Whooping cough
Maine	39	21	63	88	57	0	64	2	117
New Hampshire	----	2	----	----	9	0	----	0	----
Vermont	21	9	30	3	13	0	----	0	46
Massachusetts	273	134	1,207	178	231	0	535	16	680
Rhode Island	16	10	47	9	24	0	54	2	57
Connecticut	74	34	70	61	43	0	112	7	153
New York	604	329	2,795	507	400	43	1,769	100	1,509
New Jersey	137	226	1,250	99	116	0	475	23	339
Pennsylvania	542	331	2,053	461	529	1	570	99	1,011
Ohio	488	121	464	128	316	152	613	110	664
Indiana	44	34	148	11	122	275	245	32	147
Illinois	319	350	505	350	414	185	1,242	104	825
Michigan	319	207	797	166	331	148	520	31	843
Wisconsin	389	43	677	203	141	55	137	5	855
Minnesota	136	53	239	----	116	14	167	20	112
Iowa	23	12	78	32	36	182	42	7	61
Missouri	67	70	126	38	103	83	209	89	148
North Dakota	15	6	25	25	22	38	14	6	46
South Dakota	36	13	84	2	15	70	15	5	14
Nebraska	47	25	76	24	39	80	19	19	60
Kansas	30	19	175	83	79	76	82	70	210
Delaware	3	4	23	1	14	0	14	3	22
Maryland	71	48	55	42	56	0	251	75	226
District of Columbia	15	31	107	----	15	0	83	10	47
Virginia	106	53	451	----	106	15	135	259	564
West Virginia	25	17	92	----	63	29	55	96	174
North Carolina	77	95	118	----	112	29	----	271	900
South Carolina	103	71	13	69	13	1	118	298	250
Georgia	21	17	97	35	21	4	52	252	----
Florida	----	28	20	5	7	2	6	19	3
Kentucky [1]	----	----	----	----	----	----	----	----	----
Tennessee	6	18	124	13	51	37	[2] 195	296	71
Alabama	25	24	133	18	39	2	291	133	94
Mississippi	242	43	107	251	15	5	267	297	732

[1] Reports received weekly.

[2] Pulmonary.

Cases of certain communicable diseases reported for the month of July, 1930, by State health officers—Continued

State	Chicken pox	Diphtheria	Measles	Mumps	Scarlet fever	Smallpox	Tuberculosis	Typhoid and paratyphoid fever	Whooping cough
Arkansas	11	9	19	4	10	21	[2] 21	154	96
Louisiana	1	39	11	1	33	24	[2] 108	154	39
Oklahoma [3]	13	18	36	-------	34	116	51	167	45
Texas	-------	51	-------	-------	36	-------	-------	81	-------
Montana	16	3	16	17	36	9	61	10	296
Idaho	20	1	21	14	1	10	10	2	72
Wyoming	3	2	51	4	14	13	-------	1	9
Colorado	29	27	174	43	22	9	157	16	261
New Mexico	16	15	52	10	14	12	91	30	11
Arizona	6	2	161	11	7	5	93	37	17
Utah [1]	-------	-------	-------	-------	-------	-------	-------	-------	-------
Nevada	5	-------	-------	-------	-------	1	[2] 5	-------	-------
Washington	98	26	507	146	66	126	124	16	234
Oregon	65	15	144	56	17	36	53	23	174
California	376	211	1,995	696	209	100	941	123	683

Case Rates per 1,000 Population (Annual Basis) for the Month of July, 1930, Based on Provisional Populations

State	Chicken pox	Diphtheria	Measles	Mumps	Scarlet fever	Smallpox	Tuberculosis	Typhoid and paratyphoid fever	Whooping cough
Maine	0.57	0.31	0.93	1.29	0.84	0.00	0.94	0.03	1.72
New Hampshire	-------	.05	-------	-------	.23	.00	-------	.00	-------
Vermont	.69	.29	.98	.10	.43	.00	-------	.00	1.51
Massachusetts	.75	.37	3.33	.49	.64	.00	1.48	.04	1.88
Rhode Island	.27	.17	.80	.15	.41	.00	.92	.03	.97
Connecticut	.54	.25	.51	.45	.31	.00	.82	.05	1.12
New York	.56	.31	2.60	.47	.37	.04	1.64	.09	1.40
New Jersey	.40	.66	3.64	.29	.34	.00	1.38	.07	.99
Pennsylvania	.66	.40	2.50	.56	.64	.00	.69	.12	1.23
Ohio	.86	.21	.82	.23	.56	.27	1.08	.19	1.17
Indiana	.16	.12	.54	.04	.44	1.00	.89	.12	.54
Illinois	.49	.54	.78	.54	.64	.29	1.92	.16	1.27
Michigan	.77	.50	1.93	.40	.80	.36	1.26	.07	2.04
Wisconsin	1.56	.17	2.71	.81	.57	.22	.55	.02	3.43
Minnesota	.62	.24	1.09	-------	.53	.06	.76	.09	.51
Iowa	.11	.06	.37	.15	.17	.87	.20	.03	.29
Missouri	.22	.23	.41	.12	.33	.27	.68	.29	.48
North Dakota	.26	.10	.43	.43	.38	.65	.24	.10	.79
South Dakota	.61	.22	1.43	.03	.26	1.19	.26	.09	.24
Nebraska	.40	.21	.65	.20	.33	.68	.16	.16	.51
Kansas	.19	.12	1.09	.52	.49	.48	.51	.44	1.31
Delaware	.15	.20	1.13	.05	.69	.00	.69	.15	1.08
Maryland	.51	.35	.40	.30	.40	.00	1.81	.54	1.63
District of Columbia	.36	.75	2.58	-------	.36	.00	2.00	.24	1.13
Virginia	.52	.26	2.19	-------	.52	.07	.66	1.26	2.74
West Virginia	.17	.12	.62	-------	.43	.20	.37	.65	1.18
North Carolina	.28	.35	.44	-------	.41	.11	-------	1.00	3.33
South Carolina	.70	.48	.09	.47	.09	.01	.80	2.02	1.70
Georgia	.09	.07	.39	.14	.09	.02	.21	1.02	-------
Florida	-------	.22	.16	.04	.06	.02	.05	.15	.02
Kentucky [1]	-------	-------	-------	-------	-------	-------	-------	-------	-------
Tennessee	.03	.08	.56	.06	.23	.17	[2] .88	1.33	.32
Alabama	.11	.11	.59	.08	.17	.01	1.29	.59	.42
Mississippi	1.42	.25	.63	1.47	.09	.03	1.56	1.74	4.21

[1] Reports received weekly. [2] Pulmonary. [3] Exclusive of Oklahoma City and Tulsa.

Case Rates per 1,000 Population (Annual Basis) for the Month of July, 1930, Based on Provisional Populations—Continued

State	Chicken pox	Diphtheria	Measles	Mumps	Scarlet fever	Smallpox	Tuberculosis	Typhoid and paratyphoid fever	Whooping cough
Arkansas	.07	.06	.12	.03	.06	.13	[2].13	.98	.61
Louisiana	.01	.22	.06	.01	.18	.13	[2].61	.86	.22
Oklahoma [1]	.07	.10	.20	----	.19	.66	.29	.95	.26
Texas	----	.10	----	----	.07	----	----	.16	----
Montana	.35	.07	.35	.37	.79	.20	1.34	.22	6.50
Idaho	.53	.03	.55	.37	.03	.26	.26	.05	1.90
Wyoming	.16	.10	2.66	.21	.73	.68	----	.05	.47
Colorado	.33	.31	1.97	.49	.25	.10	1.78	.18	2.96
New Mexico	.44	.41	1.43	.27	.38	.33	2.50	.82	.30
Arizona	.16	.05	4.32	.30	.19	.13	2.50	.99	.46
Utah [1]	----	----	----	----	----	----	----	----	----
Nevada	.64	----	----	----	----	.13	[3].64	----	----
Washington	.74	.20	3.81	1.10	.50	.95	.93	.12	1.76
Oregon	.80	.18	1.77	.69	.21	.44	.65	.28	2.14
California	.77	.43	4.10	1.43	.43	.21	1.93	.25	1.40

[1] Reports received weekly.
[2] Pulmonary.
[3] Exclusive of Oklahoma City and Tulsa.

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 98 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of more than 32,165,000. The estimated population of the 91 cities reporting deaths is more than 30,570,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended November 29, 1930, and November 30, 1929

	1930	1929	Estimated expectancy
Cases reported			
Diphtheria:			
46 States	1,543	2,278	----
98 cities	550	846	1,164
Measles:			
45 States	2,332	2,839	----
98 cities	673	449	----
Meningococcus meningitis:			
46 States	89	128	----
98 cities	37	68	----
Poliomyelitis:			
46 States	123	39	----
Scarlet fever:			
46 States	3,338	3,891	----
98 cities	1,099	1,290	1,107
Smallpox:			
46 States	427	853	----
98 cities	51	84	28
Typhoid fever:			
46 States	395	310	----
98 cities	64	32	44
Deaths reported			
Influenza and pneumonia:			
91 cities	712	679	----
Smallpox:			
91 cities	0	0	----

City reports for week ended November 29, 1930

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence the number of cases of the disease under consideration that may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding weeks of the preceding years. When the reports include several epidemics, or when for other reasons the median is unsatisfactory, the epidemic periods are excluded, and the estimated expectancy is the mean number of cases reported for the week during nonepidemic years.

If the reports have not been received for the full nine years, data are used for as many years as possible but no year earlier than 1921 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviation from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND								
Maine:								
Portland	9	1	0		0	0	0	0
New Hampshire:								
Concord	0	0	0		0	0	0	0
Manchester	0	2	1		1	8	0	3
Vermont:								
Barre	2	0	1		0	0	0	0
Burlington	2	1	0		0	0	1	0
Massachusetts:								
Boston	65	38	16	2	1	32	10	17
Fall River	18	4	5		0	1	4	1
Springfield	8	5	1		0	0	5	5
Worcester	28	6	5		0	0	2	0
Rhode Island:								
Pawtucket	2	2	4		0	1	0	0
Providence	5	10	2		0	1	0	4
Connecticut:								
Bridgeport	2	6	0	1	0	0	0	0
Hartford	1	6	2		0	25	1	2
New Haven	2	2	0		0	7	3	3
MIDDLE ATLANTIC								
New York:								
Buffalo	31	19	8	1	1	6	16	18
New York	170	181	52	15	10	58	16	145
Rochester	6	6	1		0	0	3	7
Syracuse	35	3	0		0	0	1	6
New Jersey:								
Camden	9	7	6	2	2	42	5	4
Newark	34	23	10	4	3	3	2	9
Trenton	3	4	3		0	0	0	1
Pennsylvania:								
Philadelphia	150	71	15	2	3	25	22	42
Pittsburgh	52	25	10		5	14	13	28
Reading	14	3	0		0	5	9	1
EAST NORTH CENTRAL								
Ohio:								
Cincinnati	5	14	1		3	7	6	16
Cleveland	161	53	7	5	1	4	46	18
Columbus	12	11	5		0	1	0	5
Toledo	63	10	6	1	1	1	3	8
Indiana:								
Fort Wayne	7	5	5		0	3	0	1
Indianapolis	71	13	7		0	2	10	12
South Bend	0	2	1		0	0	0	1
Terre Haute	2	2	0		0	0	0	3
Illinois:								
Chicago	80	145	118	3	3	6	31	40
Springfield	1	3	1		0	0	0	2
Michigan:								
Detroit	86	69	43	2	2	16	16	18
Flint	16	4	1		0	2	0	2
Grand Rapids	7	2	0		1	0	0	0

City reports for week ended November 29, 1930—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST NORTH CENTRAL—continued								
Wisconsin:								
Kenosha	40	2	0		0	0	0	0
Madison	61	2	0			2	6	
Milwaukee	96	21	6	1	1	3	46	7
Racine	29	4	1		0	1	1	0
Superior	7	1	0		0	0	0	0
WEST NORTH CENTRAL								
Minnesota:								
Duluth	8	0	0		0	1	0	0
Minneapolis	42	30	7		0	1	16	11
St. Paul	22	15	4		0	0	4	4
Iowa:								
Davenport	2	1	0			0	0	
Des Moines	1	3	0			0	0	
Sioux City	8	2	0			1	5	
Waterloo	24	0	0			0	0	
Missouri:								
Kansas City	25	10	10		0	1	0	2
St. Joseph	0	2	2		0	0	0	3
St. Louis	41	45	23	1		328	9	
North Dakota:								
Fargo	4	0	1		0	0	9	0
Grand Forks	0	0	0			0	0	
South Dakota:								
Aberdeen	2	0	0			0	0	
Sioux Falls	0	0	0			0	0	
Nebraska:								
Omaha	16	11	9		0	1	2	5
Kansas:								
Topeka	7	2	0		0	0	0	3
Wichita	3	3	1		0	2	0	3
SOUTH ATLANTIC								
Delaware:								
Wilmington	2	3	2		0	1	0	7
Maryland:								
Baltimore	56	30	10	5	0	1	3	30
Cumberland	0	1	0		0	0	0	0
Frederick	8	0	0		0	0	0	0
District of Columbia:								
Washington	17	20	3		0	1	0	15
Virginia:								
Lynchburg	5	4	3		0	0	1	6
Norfolk	1	4	0		0	1	0	1
Richmond	3	15	3		0	13	2	7
Roanoke	12	4	4		0	0	0	0
West Virginia:								
Charleston	10	2	1		0	0	0	1
Wheeling	18	2	0		0	1	0	3
North Carolina:								
Raleigh	6	2	2		0	0	0	0
Wilmington	0	1	2		0	0	0	2
Winston-Salem	9	3	0		0	0	0	4
South Carolina:								
Charleston	0	2	0	10	0	0	0	2
Columbia	3	1	0		0	0	2	3
Greenville	2	0	1		0	0	0	0
Georgia:								
Atlanta	3	7	1	22	2	4	0	5
Brunswick	1	0	0		1	0	0	2
Savannah	0	3	2	5	1	1	0	3
Florida:								
Miami	0	3	1		0	0	0	0
St. Petersburg		0			0			0
Tampa	0	3	0	2	1	0	0	0

City reports for week ended November 29, 1930—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST SOUTH CENTRAL								
Kentucky:								
Covington	1	2	1	----	0	1	1	1
Tennessee:								
Memphis	25	8	7	----	1	2	3	3
Nashville	2	3	2	----	0	0	0	7
Alabama:								
Birmingham	2	7	6	----	3	8	0	5
Mobile	0	1	4	----	0	0	0	5
Montgomery	0	2	3	----	----	0	0	----
WEST SOUTH CENTRAL								
Arkansas:								
Fort Smith	1	1	0	----	----	0	0	----
Little Rock	0	1	3	----	0	0	0	1
Louisiana:								
New Orleans	2	15	7	2	3	2	0	21
Shreveport	2	1	0	----	0	0	0	3
Oklahoma:								
Muskogee	1	3	5	----	0	2	0	0
Tulsa	0	6	1	----	----	2	0	----
Texas:								
Dallas	26	18	9	----	0	0	2	2
Fort Worth	3	7	11	----	1	0	1	3
Galveston	0	1	8	----	0	0	0	0
Houston	0	10	12	----	0	1	0	8
San Antonio	4	6	5	----	1	0	1	8
MOUNTAIN								
Montana:								
Billings	4	0	0	----	1	0	0	4
Great Falls	4	0	0	----	0	0	0	2
Helena	4	0	0	----	0	0	0	0
Missoula	0	0	1	----	0	0	0	1
Idaho:								
Boise	0	0	0	----	0	0	0	0
Colorado:								
Denver	47	11	5	----	0	9	11	9
Pueblo	3	1	0	----	0	21	0	3
New Mexico:								
Albuquerque	6	1	0	----	0	0	0	2
Utah:								
Salt Lake City	14	5	3	----	2	2	0	6
Nevada:								
Reno	0	0	0	----	0	0	0	1
PACIFIC								
Washington:								
Seattle	11	6	3	----	----	0	8	----
Spokane	20	3	0	----	----	1	0	----
Tacoma	1	3	12	----	0	0	0	2
Oregon:								
Portland	16	12	0	1	0	3	2	2
Salem	0	0	1	----	0	0	0	0
California:								
Los Angeles	9	43	27	34	3	3	14	20
Sacramento	2	3	1	----	0	----	7	2
San Francisco	27	17	3	1	0	1	8	4

City reports for week ended November 29, 1930—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
NEW ENGLAND											
Maine:											
Portland	3	2	0	0	0	0	0	2	0	8	21
New Hampshire:											
Concord	0	0	0	0	0	0	0	0	0	0	8
Manchester	2	0	0	0	0	0	0	0	0	0	22
Vermont:											
Barre	0	0	0	0	0	0	0	0	0	0	0
Burlington	1	0	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	64	50	0	0	0	12	2	2	0	15	204
Fall River	3	5	0	0	0	3	0	1	0	1	26
Springfield	5	4	0	0	0	1	0	0	0	2	32
Worcester	10	19	0	0	0	2	0	0	0	3	39
Rhode Island:											
Pawtucket	1	5	0	0	0	0	0	0	0	0	15
Providence	10	10	0	0	0	7	0	0	0	4	61
Connecticut:											
Bridgeport	8	4	0	0	0	0	0	0	0	0	19
Hartford	5	8	0	0	0	4	0	0	0	5	51
New Haven	4	2	0	0	0	1	0	0	0	6	32
MIDDLE ATLANTIC											
New York:											
Buffalo	23	20	0	1	0	2	1	0	0	15	124
New York	134	107	0	0	0	81	15	4	1	108	1,297
Rochester	8	34	0	0	0	1	0	0	0	15	57
Syracuse	10	7	0	0	0	1	0	0	0	8	47
New Jersey:											
Camden	4	1	0	0	0	1	0	0	0	0	34
Newark	14	13	0	0	0	9	1	0	0	19	89
Trenton	2	10	0	0	0	1	0	0	0	0	25
Pennsylvania:											
Philadelphia	71	77	0	0	0	27	3	2	1	29	398
Pittsburgh	36	57	0	0	0	7	0	0	0	5	162
Reading	1	0	0	0	0	3	0	0	0	1	25
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	16	15	0	0	0	5	1	0	0	1	119
Cleveland	34	57	0	0	0	9	1	3	0	6	160
Columbus	11	4	0	0	0	5	0	0	1	0	77
Toledo	12	7	0	1	0	1	1	0	0	0	51
Indiana:											
Fort Wayne	3	0	0	0	0	1	0	0	0	0	22
Indianapolis	13	37	3	2	0	3	0	0	0	9	85
South Bend	2	1	0	0	0	2	0	0	0	1	25
Terre Haute	4	0	0	0	0	2	0	0	0	2	29
Illinois:											
Chicago	108	131	1	0	0	43	3	2	1	37	641
Springfield	2	2	0	0	0	0	0	0	0	1	14
Michigan:											
Detroit	80	62	0	1	0	20	2	1	0	40	226
Flint	14	11	1	0	0	0	0	0	0	2	14
Grand Rapids	10	13	0	3	0	1	0	0	0	5	32
Wisconsin:											
Kenosha	0	6	1	0	0	0	0	0	0	2	8
Madison	1	6	1	0			0	0		7	
Milwaukee	20	13	0	0	0	2	1	1	0	19	93
Racine	5	1	0	0	0	0	0	0	0	5	9
Superior	3	4	0	0	0	0	0	0	0	1	9
WEST NORTH CENTRAL											
Minnesota:											
Duluth	9	0	0	0	0	2	0	0	0	5	15
Minneapolis	48	10	1	0	0	3	0	0	0	4	87
St. Paul	24	1	2	0	0	3	0	0	0	6	53

City reports for week ended November 29, 1930—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
WEST NORTH CENTRAL—continued											
Iowa:											
Davenport	1	1	0	2	----	----	0	0	----	0	----
Des Moines	11	4	1	4	----	----	0	0	----	0	20
Sioux City	2	4	0	0	----	----	0	0	----	0	----
Waterloo	2	0	0	0	----	----	0	0	----	0	----
Missouri:											
Kansas City	15	14	0	0	0	9	0	1	0	5	79
St. Joseph	3	3	0	0	0	0	0	0	0	0	21
St. Louis	32	27	0	0	0	3	2	3	1	3	179
North Dakota:											
Fargo	4	0	0	0	0	0	0	0	0	0	10
Grand Forks	2	0	0	0	----	----	0	0	----	0	----
South Dakota:											
Aberdeen	0	0	0	1	----	----	0	0	----	0	----
Sioux Falls	3	0	0	0	----	----	0	0	----	0	9
Nebraska:											
Omaha	5	8	1	29	0	2	0	0	0	0	52
Kansas:											
Topeka	3	1	1	0	0	0	0	0	0	3	21
Wichita	5	4	0	6	0	0	0	0	0	0	24
SOUTH ATLANTIC											
Delaware:											
Wilmington	3	4	0	0	0	0	0	0	0	0	36
Maryland:											
Baltimore	22	15	0	0	0	15	2	4	0	13	187
Cumberland	1	1	0	0	0	0	0	0	0	0	8
Frederick	0	1	0	0	0	0	0	0	0	0	3
District of Columbia:											
Washington	19	28	0	0	0	9	1	2	0	0	152
Virginia:											
Lynchburg	2	0	0	0	0	1	0	5	0	0	16
Norfolk	3	3	0	0	0	3	0	0	0	0	----
Richmond	8	13	0	0	0	1	1	0	0	1	44
Roanoke	4	3	0	0	0	0	0	0	0	0	18
West Virginia:											
Charleston	2	2	0	0	0	0	1	0	0	0	9
Wheeling	2	3	0	0	0	6	0	0	0	0	14
North Carolina:											
Raleigh	1	5	0	0	0	2	0	0	0	0	13
Wilmington	1	0	0	0	0	0	0	0	0	1	10
Winston-Salem	3	1	1	0	0	1	0	0	0	0	19
South Carolina:											
Charleston	2	2	0	0	0	2	0	0	0	0	20
Columbia	0	2	0	0	0	0	0	1	0	0	14
Greenville	0	0	0	0	0	0	0	0	0	1	----
Georgia:											
Atlanta	6	10	0	0	0	4	0	1	1	1	47
Brunswick	0	0	0	0	0	1	0	0	0	0	10
Savannah	1	3	1	0	0	2	1	2	0	0	36
Florida:											
Miami	1	1	0	0	0	5	0	0	0	0	23
St. Petersburg	0	----	0	----	0	0	0	----	0	----	11
Tampa	1	1	0	0	0	1	0	1	0	1	23
EAST SOUTH CENTRAL											
Kentucky:											
Covington	3	10	0	0	0	1	0	0	0	0	13
Tennessee:											
Memphis	6	7	1	0	0	8	1	2	0	4	80
Nashville	3	4	0	0	0	3	1	0	0	2	45
Alabama:											
Birmingham	4	8	0	0	0	4	1	0	0	3	64
Mobile	1	2	0	0	0	0	0	0	0	0	27
Montgomery	0	5	0	0	----	----	0	0	----	7	----

City reports for week ended November 29, 1930—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	2	1	0	0	----	----	0	0	----	0	----
Little Rock	3	2	0	0	0	0	0	3	0	0	----
Louisiana:											
New Orleans	9	14	1	0	0	6	1	1	1	2	139
Shreveport	2	2	0	0	0	0	0	0	1	0	35
Oklahoma:											
Muskogee	2	1	0	0	0	0	0	5	0	0	----
Tulsa	3	8	1	0	----	----	0	0	----	0	----
Texas:											
Dallas	8	7	0	0	0	4	0	1	1	9	55
Fort Worth	2	7	0	0	0	0	0	0	1	0	28
Galveston	0	1	0	0	0	0	0	13	0	0	11
Houston	3	8	0	1	0	2	0	2	0	0	63
San Antonio	1	3	1	0	0	5	0	0	0	0	54
MOUNTAIN											
Montana:											
Billings	1	1	0	4	0	0	0	0	0	4	13
Great Falls	1	2	0	0	0	0	0	0	0	0	12
Helena	1	0	0	0	0	0	0	0	0	0	5
Missoula	0	0	0	0	0	0	0	0	0	0	6
Idaho:											
Boise	1	3	0	0	0	0	0	0	0	0	4
Colorado:											
Denver	12	16	0	0	0	6	0	0	0	3	78
Pueblo	2	0	0	0	0	0	0	1	0	5	8
New Mexico:											
Albuquerque	1	0	0	0	0	8	0	1	0	2	14
Utah:											
Salt Lake City	2	4	2	0	0	2	0	0	0	4	27
Nevada:											
Reno	0	0	0	0	0	0	0	0	0	0	2
PACIFIC											
Washington:											
Seattle	9	13	1	0	----	----	1	0	----	14	----
Spokane	9	3	3	2	----	----	0	0	----	2	----
Tacoma	3	5	2	2	0	0	0	1	0	4	26
Oregon:											
Portland	8	5	4	1	0	0	1	1	0	0	63
Salem	0	1	0	0	0	0	0	0	0	0	----
California:											
Los Angeles	32	7	2	0	0	18	1	1	0	17	267
Sacramento	3	4	1	0	0	3	0	1	0	7	26
San Francisco	15	9	1	0	0	10	0	0	0	23	197

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
NEW ENGLAND									
Maine:									
Portland	0	0	0	0	0	0	0	0	1
Massachusetts:									
Boston	0	0	1	0	1	0	1	10	0
Worcester	0	0	0	0	0	0	0	2	0
MIDDLE ATLANTIC									
New York:									
New York	9	8	3	0	0	0	3	0	1
Rochester	1	0	0	0	0	0	0	0	0
New Jersey:									
Newark	2	0	0	0	0	0	1	0	0
Pennsylvania:									
Philadelphia	2	1	1	1	0	0	0	0	0
Pittsburgh	1	1	0	1	0	0	0	0	0

City reports for week ended November 29, 1930—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	1	0	0	0	0	0	0	0	0
Cleveland	3	1	0	0	0	0	0	5	1
Columbus	0	0	0	0	0	0	0	1	0
Indiana:									
Indianapolis	2	2	0	0	0	0	0	0	0
Terre Haute	0	1	0	0	0	0	0	0	0
Illinois:									
Chicago	5	1	1	0	0	0	1	4	1
Michigan:									
Detroit	1	2	1	0	0	0	0	0	0
WEST NORTH CENTRAL									
Minnesota:									
Minneapolis	1	0	0	0	0	0	0	0	0
Missouri:									
St. Louis	3	0	0	0	0	0	0	0	0
Nebraska:									
Omaha	0	0	0	0	0	0	0	1	0
SOUTH ATLANTIC[1]									
South Carolina:									
Charleston	0	0	0	0	4	0	0	0	0
Georgia:									
Atlanta	1	1	0	0	0	0	0	0	0
Savannah [1]	0	0	0	0	1	1	0	0	0
Florida:									
Miami	0	0	0	0	0	1	0	0	0
EAST SOUTH CENTRAL									
Kentucky:									
Covington	0	1	0	0	0	0	0	1	0
Tennessee:									
Memphis	0	0	0	0	0	0	0	1	0
Nashville	1	2	0	0	0	0	0	1	1
Alabama:									
Birmingham	0	0	0	0	1	0	0	1	0
Mobile	0	0	0	0	0	1	0	0	0
WEST SOUTH CENTRAL									
Louisiana:									
New Orleans	0	1	0	0	1	1	0	0	0
Shreveport	0	0	0	0	0	1	0	0	0
Texas:									
Dallas	1	1	0	0	0	1	0	1	0
Fort Worth	0	0	0	0	0	0	0	1	0
Houston	0	0	0	0	0	1	0	0	0
San Antonio	0	0	0	0	0	0	0	1	0
MOUNTAIN									
Colorado:									
Denver	1	1	0	0	0	0	0	0	0
Utah:									
Salt Lake City	1	0	0	0	0	0	0	0	0
PACIFIC									
Oregon:									
Portland	1	0	0	0	0	0	1	0	0
California:									
Los Angeles	0	1	0	0	1	0	0	2	0
Sacramento	1	0	0	0	0	0	0	0	0
San Francisco	0	0	0	0	0	1	1	3	2

[1] Typhus fever: 4 cases, 2 cases at Baltimore, Md., and 2 cases at Savannah Ga.

The following tables give the rates per 100,000 population for 98 cities for the 5-week period ended November 29, 1930, compared with those for a like period ended November 30, 1929. The population figures used in computing the rates are approximate estimates, authoritative figures for many of the cities not being available. The 98 cities reporting cases have an estimated aggregate population of more than 32,000,000. The 91 cities reporting deaths have more than 30,500,000 estimated population.

Summary of weekly reports from cities October 26 to November 29, 1930—Annual rates per 100,000 population, compared with rates for the corresponding period of 1929 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	Nov. 1, 1930	Nov. 2, 1929	Nov. 8, 1930	Nov. 9, 1929	Nov. 15, 1930	Nov. 16, 1929	Nov. 22, 1930	Nov. 23, 1929	Nov. 29, 1930	Nov. 30, 1929
98 cities	91	143	[2] 84	156	91	159	[3] 102	[4] 186	89	139
New England	84	114	[5] 79	119	75	168	113	117	80	177
Middle Atlantic	47	99	35	104	46	112	54	123	50	123
East North Central	131	168	110	195	130	205	125	302	123	167
West North Central	91	160	[6] 75	200	104	165	[7] 89	169	108	114
South Atlantic	106	144	79	125	110	122	[8] 143	135	60	144
East South Central	331	205	243	219	209	232	310	239	155	157
West South Central	108	434	213	480	172	427	183	446	164	259
Mountain	34	17	120	61	26	44	26	[4] 89	77	17
Pacific	78	111	109	97	73	84	[9] 94	60	111	56

MEASLES CASE RATES

98 cities	61	38	[2] 58	44	93	56	[3] 69	[4] 72	109	74
New England	126	27	[5] 94	20	157	45	164	56	148	70
Middle Atlantic	29	33	35	20	71	26	80	34	73	33
East North Central	18	40	16	68	17	91	31	94	28	101
West North Central	288	52	[6] 275	94	491	50	[7] 17	81	636	100
South Atlantic	18	15	44	9	24	7	[8] 59	24	40	22
East South Central	47	0	94	7	20	14	169	14	74	0
West South Central	0	0	0	4	0	19	4	27	11	38
Mountain	403	244	223	61	300	252	318	[4] 107	275	131
Pacific	28	58	28	113	38	142	[9] 42	280	12	249

SCARLET FEVER CASE RATES

98 cities	165	155	[2] 172	191	191	205	[3] 200	[4] 218	178	212
New England	195	77	[5] 204	276	253	265	217	249	241	258
Middle Atlantic	139	89	140	102	133	135	168	127	156	116
East North Central	220	226	234	295	290	311	266	347	224	361
West North Central	159	160	[6] 137	187	140	139	[7] 199	223	137	183
South Atlantic	152	139	145	167	141	238	[8] 198	163	172	139
East South Central	277	205	331	178	310	157	236	157	243	137
West South Central	71	149	97	152	127	152	101	156	142	118
Mountain	335	226	275	357	378	226	275	[4] 267	223	348
Pacific	54	181	111	176	116	179	[9] 101	261	97	266

[1] The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Populations used are estimates as of July 1, 1930, and 1929, respectively.
[2] Hartford, Conn., and Waterloo, Iowa, not included.
[3] St. Louis, Mo., Atlanta, Ga., and San Francisco, Calif., not included.
[4] Reno, Nev., not included.
[5] Hartford, Conn., not included.
[6] Waterloo, Iowa, not included.
[7] St. Louis, Mo., not included.
[8] Atlanta, Ga., not included.
[9] San Francisco, Calif., not included.

Summary of weekly reports from cities October 26, to November 29, 1930—Annual rates per 100,000 population, compared with rates for the corresponding period of 1929—Continued

SMALLPOX CASE RATES

	Week ended—									
	Nov. 1, 1930	Nov. 2, 1929	Nov. 8, 1930	Nov. 9, 1929	Nov. 15, 1930	Nov. 16, 1929	Nov. 22, 1930	Nov. 23, 1929	Nov. 29, 1930	Nov. 30, 1929
98 cities	3	13	[2] 2	9	4	13	[3] 3	[4] 24	8	14
New England	0	0	[5] 0	2	0	25	0	0	0	0
Middle Atlantic	0	0	0	0	0	0	0	0	0	0
East North Central	1	20	4	15	2	22	0	33	4	13
West North Central	19	42	[6] 6	29	21	42	[7] 33	50	66	48
South Atlantic	0	0	0	0	0	0	[8] 0	2	0	0
East South Central	0	14	0	0	0	0	0	0	0	0
West South Central	4	27	7	8	4	4	4	38	4	11
Mountain	9	61	9	17	0	9	43	[4] 71	34	35
Pacific	17	29	7	19	21	31	[9] 7	111	9	75

TYPHOID FEVER CASE RATES

98 cities	14	11	[3] 11	9	15	8	[3] 15	[4] 13	10	5
New England	4	7	[5] 5	11	22	22	15	11	11	2
Middle Atlantic	10	8	5	8	4	3	5	10	3	2
East North Central	8	6	9	6	5	6	9	9	4	5
West North Central	13	17	[6] 4	12	19	4	[7] 22	12	8	6
South Atlantic	29	13	29	13	31	9	[8] 26	19	29	4
East South Central	115	34	27	21	54	14	13	34	13	34
West South Central	15	19	30	11	93	8	90	34	75	15
Mountain	0	78	17	17	26	44	51	[4] 36	9	26
Pacific	21	2	19	7	12	10	[9] 13	5	7	2

INFLUENZA DEATH RATES

91 cities	9	11	[3] 9	8	10	9	[10] 10	[4] 8	9	11
New England	2	2	[5] 2	4	4	9	7	4	2	4
Middle Atlantic	9	9	13	8	9	4	8	9	11	5
East North Central	6	9	6	8	9	9	5	6	7	10
West North Central	9	6	3	3	6	3	6	9	0	21
South Atlantic	16	19	9	4	5	11	[8] 16	4	9	17
East South Central	15	30	29	37	44	22	15	30	29	15
West South Central	23	27	15	12	31	31	38	16	15	55
Mountain	17	26	9	0	9	26	60	[4] 9	26	17
Pacific	3	3	9	16	6	9	[9] 10	6	9	13

PNEUMONIA DEATH RATES

91 cities	101	105	[4] 104	105	118	98	[10] 120	[4] 101	112	106
New England	95	74	[4] 82	119	104	88	115	88	71	92
Middle Atlantic	115	113	122	115	136	103	140	106	125	101
East North Central	88	101	75	78	86	71	83	96	78	84
West North Central	95	135	86	108	77	120	136	102	92	126
South Atlantic	123	116	139	137	157	107	[8] 137	94	165	129
East South Central	74	157	155	90	214	231	199	254	155	224
West South Central	111	105	119	125	111	121	123	129	165	156
Mountain	163	131	189	131	215	157	163	[4] 107	223	157
Pacific	40	31	52	72	83	85	[9] 76	28	86	104

[2] Hartford, Conn., and Waterloo, Iowa, not included.
[3] St. Louis, Mo., Atlanta, Ga., and San Francisco, Calif., not included.
[4] Reno, Nev., not included.
[5] Hartford, Conn., not included.
[6] Waterloo, Iowa, not included.
[7] St. Louis, Mo., not included.
[8] Atlanta, Ga., not included.
[9] San Francisco, Calif., not included.
[10] Atlanta, Ga., and San Francisco, Calif., not included.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended November 29, 1930.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended November 29, 1930, as follows:

Province	Influenza	Poliomyelitis	Smallpox	Typhoid fever
Prince Edward Island [1]				
Nova Scotia	2			1
New Brunswick				5
Quebec	3			22
Ontario	1	6	12	6
Manitoba				2
Saskatchewan				2
Alberta [1]				
British Columbia		2		
Total	6	8	12	38

[1] No case of any disease included in the table was reported during the week.

Quebec Province—Communicable diseases—Week ended November 29, 1930.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the week ended November 29, 1930, as follows:

Disease	Cases	Disease	Cases
Chicken pox	192	Ophthalmia neonatorum	1
Diphtheria	79	Paratyphoid fever	1
Erysipelas	6	Scarlet fever	158
German measles	3	Tuberculosis	47
Influenza	3	Typhoid fever	22
Measles	91	Whooping cough	79
Mumps	100		

Quebec Province—Vital statistics—August, 1930.—Births, deaths, and marriages for the month of August, 1930, in the Province of Quebec, Canada, with deaths from certain specified causes, are shown in the following table:

Estimated population	2,735,000	Deaths from—	
Births	6,477	Influenza	11
Birth rate per 1,000 population	27.9	Lethargic encephalitis	2
Deaths	2,723	Measles	5
Death rate per 1,000 population	11.7	Pneumonia	92
Marriages	1,926	Poliomyelitis	4
Deaths under 1 year	888	Scarlet fever	6
Deaths under 1 year per 1,000 births	137.1	Syphilis	15
Deaths from—		Tuberculosis (pulmonary)	175
Cancer	194	Tuberculosis (other forms)	46
Diabetes	16	Typhoid fever	15
Diarrhea	401	Violence	145
Diphtheria	15	Whooping cough	29
Heart disease	241		

CUBA

Habana—Communicable diseases—November, 1930.—During the month of November, 1930, certain communicable diseases were reported in the city of Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chicken pox	4	1	Paratyphoid fever	1	
Diphtheria	8	2	Scarlet fever	12	
Leprosy		1	Tuberculosis	28	3
Malaria [1]	21	1	Typhoid fever [1]	19	3

[1] Many of these cases are from the island outside of Habana.

MEXICO

Tampico—Communicable diseases—November, 1930.—During the month of November, 1930, certain communicable diseases were reported in Tampico, Mexico, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	2	2	Malaria	255	9
Enteritis (various)		47	Smallpox	2	
Influenza	3	1	Tuberculosis	22	21
Leprosy	1		Whooping cough	10	1

PORTO RICO

San Juan—Communicable diseases—Five weeks ended November 22, 1930.—During the five weeks ended November 22, 1930, cases of certain communicable diseases were reported in San Juan, Porto Rico, as follows:

Disease	Cases	Disease	Cases
Diphtheria	5	Tetanus	4
Malaria	20	Typhoid fever	5
Measles	1	Whooping cough	21

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Hygiene, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		June 1–28, 1930	June 29–July 26, 1930	July 27–Aug. 23, 1930	Aug. 24–Sept. 20, 1930	Week ended— Sept. 27, 1930	October, 1930: 4	11	18	25	November, 1930: 1	8	15	22	29	Dec. 6, 1930
Afghanistan	C		[1] P	P												
China:																
Amoy	C				2											
	D				2											
Canton	C	2	2				1			1						
	D		1													
Shanghai	C				34	23	[2]	6	4	1		1				
	D				[3]	2			2							
Shensi Province	C				P											
Swatow	C	7		3	2											
Tientsin	C			2	1											
India	C	37,102	26,121	42,893	51,551	11,109	10,172									
	D	25,711	13,822	22,358	23,959	5,225	4,808									
Bassein	C				1											
Bombay	C			14	1	1	3	1	11	17	1	1		2		
	D			8	2	1	2		8	10	6	1		2		
Calcutta	C	327	220	63	27	4	4	7	9	7	7	11		4		
	D	179	128	30	12	3	4	4	4	4	2	6		4		
Madras	C			1				2			1					
	D			1				2								
Negapatam	C	1														
	D	1														
Rangoon	C	6	1	1	2			1								
	D	4	1	1	1			1								
Tuticorin	C								1				1	4		
	D								1				1			
India (French):																
Chandernagor	C	3	1		1		1	2								
	D	2					1									
Karikal	C	3														
	D	3														
Pondicherry	C							1								
	D							1								

India (Portuguese)	C			1	1												
Indo-China (see also table below):	C	40	32	11		1		1		1							
Pnompenh	D	18	22	6												1	
	C	48	10	5		1	1			1						1	
Saigon and Cholon	D	23	3	1													
Philippine Islands: [1]																	
Ports—																	
Cebu	C	1	65	9	2												
	D		36	8	2											1	
Iloilo	C		29	64	10	1				2						3	
	D		22	56	14	2											
Manila	C			1	43	2	1	2									
	D				12		1										
Provinces—																	
Antique	C			20	47	12		28									
	D			12	34	8		10									
Bohol	C			138	49												
	D			79	20												
Bulacan	C	3	4	1	4		2										
	D	1			2		1										
Capiz	C		3	2	1												
	D		2	2													
Cebu	C	355	713	85	25												
	D	170	303	50	11												
Iloilo	C	2	309	571	238	18	7	13	12	10	10	4	6	11	21	13	
	D	1	193	376	151	15	6	7	12	7	7	3	6	8	11	8	
La Union	C		1														
Leyte	C	47	1														
	D	19	11														
Masbate	C	10	92	34													
	D	3	35	14													
Misamis, Occidental	C		3														
	D		3														
Negros, Occidental	C	140	568	343	122	8	10	5	5	12	3	19	22	44	38	48	
	D	88	368	237	91	6	5	6	3	12	3	12	14	33	17	45	
Negros, Oriental	C		23	8													
	D		13	4													
Nueva Acija	C		1														
	D		1														
Pampanga	C	2	2		1												
Pangasinan	C		3	1													
	D		2	1													
Rizal	C	1	1									4					
	D								3	6	3	4	3	4	4		
Samar	C			18	4	4			3	5	1	4	2	4	4		
	D			16	2	4						5					
Sorsogon	C											4					
	D	1	1														

[1] An outbreak of cholera was reported in June, 1930 in Afghanistan.
[1] Figures for cholera in the Philippine Islands are subject to correction.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

CHOLERA—Continued

[C indicates cases; D, deaths; P, present]

Place		June 1-28, 1930	June 29-July 26, 1930	July 27-Aug. 23, 1930	Aug. 24-Sept. 20, 1930	Week ended— Sept. 27, 1930	October, 1930 4	11	18	25	November, 1930 1	8	15	22	29	Dec. 6, 1930
Philippine Islands—Continued.																
Provinces—Continued.																
Surigao	C			28	1	(1)										
	D			17	2											
Tarlac	C			1												
Siam	C	27	20	3				1	3	3		1			1	
	D	19	9	2					1	3		1				
Bangkok	C	12	8	1				1	2	1	2			2		
	D	5	3	1				1	1	1	1			2		
Songkla	C		10													
	D		6													
On vessel:																
S. S. Malwa from Shanghai	D				1											
On small boat at Port Cebu, from Bantayan Island	C	1														
	D	1														

Place		May, 1930	June, 1930	July, 1930	August, 1930 1-10	11-20	21-31	September, 1930 1-10	11-20	21-30	October, 1930 1-10	11-20	21-31
Indo-China (French) (see also table above):													
Annam[2]	C	23	16	1		3							
Cambodia[2]	C	88	144	43	37	22		23	13	2	16		6
Cochin-China[2]	C	671	273	46	22	5		9	6	18	14	6	8

[1] During the period from Aug. 24 to Sept. 26, 1930, 26 cases of cholera with 17 deaths were reported in Manitum, Surigao Province, P. I.
[2] Reports incomplete.

Place		June 1–28, 1930	June 29–July 26, 1930	July 27–Aug. 23, 1930	Week ended— Aug. 30, 1930	Sept. 6	Sept. 13	Sept. 20	Sept. 27	Oct. 4	Oct. 11	Oct. 18	Oct. 25	Nov. 1	Nov. 8	Nov. 15	Nov. 22	Nov. 29
Algeria:																		
Algiers	C		3	7	1	2	6	2	1	1	2	2	5	3	1	2		
	D												3					
Constantine	C	1	1												1			
Oran	C		3	4	1	2	3	4		4	4	2	1			1		
	D						1				2	1						
Plague-infected rats			2			10			2			4	1					
Philippeville	C					1			1		1	1	1		1			
Belgian Congo	C		2	2	2	3										1		
	D		2	2		3												
British East Africa (see also table below): Uganda	C	406	228	236	44	40	57	61	65	18	32							
	D	328	213	229	37	39	55	60	65	18	32							
Canary Islands: Las Palmas	D			1														
Ceylon:																		
Colombo	C	1	3	2	2				1	1		1				1	1	
	D	1	3	2	3				1	1		1				1	1	
Plague-infected rats		1	1													1	1	
China:																		
Manchuria—Tungliau and Nungan	C			30			29	P	2									
Shensi	C							P					P					
Dutch East Indies:																		
Batavia and West Java	C	98	84	83	13	14	26	26	22	14	26	45	41					
	D	98	84	83	12	14	26	24	22	14	26	41	42					
Plague-infected rats		4		1		1	1	1										
Java and Madura	D	202	217	188	55	54	67	84	75	68	95	97	124					
Ecuador (see table below).																		
Egypt:																		
Alexandria	C	19	23	11	3	3	2	2	2	1	3	3	2	1	1	3		1
	D	9	10	6	5	1	2		3	1	1	1	3		2	2		
Assiout	C	9	2												3			2
	D	3	2												1			
Beni-Suef	C			1														
Dakahlieh	C	1																
Gharbieh	C			3														
	D			1														
Girga	C		1		1													
Minieh	C	10	3															
	D	1																
Port Said	C	2	1	1									1					

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		June 1–28, 1930	June 29–July 26, 1930	July 27–Aug. 23, 1930	Week ended— Aug. 30, 1930	Sept. 6	Sept. 13	Sept. 20	Sept. 27	Oct. 4	Oct. 11	Oct. 18	Oct. 25	Nov. 1	Nov. 8	Nov. 15	Nov. 22	Nov. 29
France:																		
Marseille	C				2	2	1					4	2	1		1		
St. Ouen	C		1															
	D		1															
Gambia	C			4														
	D			4														
Greece (see also table below):																		
Patras	C	1	1															
Pyrgos	C									2								
Hawaii Territory, Hamakua, Hawaii: Plague-infected rats		1																
India	C	240	377	877	593	600	704	600	672	527								
	D	187	256	477	262	201	328	251	289	222								
Bassein	C				1		1							1				
	D				1		2											
Bombay	C	3	1			1			1			1	1					
	D	2	1			1				1		1		1				
Plague-infected rats		26	52	35	12	9	11	15	21	13	16	14	2	9	11	8	11	
Madras Presidency	C	39	47	81		47	41	39	41	59	46	50						
	D	22	31	34		23	13	21	14	32	31	33						
Rangoon	C	1	2	3	2	1	5	2	2					1		1		
	D	1	2	2	2	1	4	2	2					1				
Plague-infected rats		1	6	7	2		2	4		1			1				1	
India (Portuguese)	D			P										3				
Indo-China (see also table below):																		
Pnompenh	C	6	2	4	2	1			1	1							1	3
	D	7	2						1	1	1		1				1	3
Saigon and Cholon	C	2		1		1			1									
	D	1																
Iraq: Baghdad	C	28	18	9					1									
	D	15	7	3					1									
Kwang-Chow-Wan	C	31	4	1														
Madagascar (see also table below): Tamatave	C	1	1	2		1	P			1			3		2			
	D									1			3					
Morocco	C	3	1	15									4		1			
	D	4		2														

Nigeria: Lagos	C	5	1	7	1	1	3	1		3		2	33	1	2	2		
	D	5	1	7	1	1	3	1		3		2		1	2	2		
Plague-infected rats		11	18	8		4	2	4				11	3					
Senegal (see table below).																		
Siam	C			7	3								3	1	1			
	D			6	2								3	1				
Bangkok	C			3														
	D			2														
Nagara Rajsima	C			2		1						1				1		
	D			2		1						1				1		
Syria: Beirut	C	12	9	2	3	2							1		3	1		
Tripolitania	C			2													4	
Tunisia:																		
Sfax district	C	9	6	1														
Tunis	C	1	5											1		1		
	D	1	1															
Union of Socialist Soviet Republics:																		
Salsk Region	C	2	5	7														
	D	1	4	5														
Stavropol Region	C	1																
	D	1																
Union of South Africa:																		
Cape Province	C	1	1	1				1					1					
	D		1	1			1											
Orange Free State	C				1		1											
	D				1		1											

Place		May, 1930	June, 1930	July, 1930	Aug., 1930	Sept., 1930	Oct., 1930
British East Africa (see also table above):							
Kenya	C	171	107	97	87	53	50
Ecuador: Guayaquil	C	0	0				
	D	0	0				
Plague-infected rats		0	0				
Greece (see also table above)	C		1				
Indo-China (see also table above)	C		11	1	2	4	
Madagascar (see also table above):							
Ambositra Province	C	1					
	D	1					
Antisirabe Province	C	19	3	24	11	21	
	D	19	3	24	11	21	
Miarinarivo Province	C	5	1	1	2	7	
	D	5	1	1	2	7	
Moramanga Province	C	1	3		27	18	
	D		3		27	17	

Place		May, 1930	June, 1930	July, 1930	Aug., 1930	Sept., 1930	Oct., 1930
Madagascar (see also table above)—Con.							
Tananarive Province	C	15	16	28	39	79	
	D	14	16	28	38	79	
Senegal:							
Baol [1]	C	13	2	62	79	48	53
	D	11	2	48	20	23	35
Dakar [1]	C	52	53	140	108	3	
	D	42	117	122	90	8	
Louga [1]	C	54	60	138	75	61	37
	D	27	21	103	33	30	25
Thies [1]	C	21	52	54	34	12	24
	D	8	35	30	20	4	15
Tivaouane [1]	C	135	43	119	110	20	53
	D	69	28	70	54	14	31

[1] Incomplete reports.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		June 1–28, 1930	June 29–July 26, 1930	July 27–Aug. 23, 1930	Week ended— Aug. 30, 1930	Sept. 6	Sept. 13	Sept. 20	Sept. 27	Oct. 4	Oct. 11	Oct. 18	Oct. 25	Nov. 1	Nov. 8	Nov. 15	Nov. 22	Nov. 29
France:																		
Marseille	C				2	2	1					4	2	1		1		
St. Ouen	C		1															
	D		1															
Gambia	C			4														
	D			4														
Greece (see also table below):																		
Patras	C	1	1															
Pyrgos	C									2								
Hawaii Territory, Hamakua, Hawaii: Plague-infected rats		1																
India	C	240	377	877	593	600	704	600	672	527								
	D	187	256	477	262	201	328	251	289	222								
Bassein	C				1		1							1				
	D				1		2											
Bombay	C	3	1			1			1			1	1					
	D	2	1			1				1		1		1				
Plague-infected rats		26	52	35	12	9	11	15	21	13	16	14	2	9	11	8	11	
Madras Presidency	C	39	47	81		47	41	39	41	59	46	50						
	D	22	31	34		23	13	21	14	32	31	33						
Rangoon	C	1	2	3	2	1	5	2	2					1		1		
	D	1	2	2	2	1	4	2	2					1				
Plague-infected rats		1	6	7	2		2	4		1			1				1	
India (Portuguese)	D			P										3				
Indo-China (see also table below):																		
Pnompenh	C	6	2	4	2	1			1	1							1	3
	D	7	2						1	1	1		1				1	3
Saigon and Cholon	C	2		1		1			1									
	D	1																
Iraq: Baghdad	C	28	18	9					1									
	D	15	7	3					1									
Kwang-Chow-Wan	C	31	4	1														
Madagascar (see also table below): Tamatave	C	1	1	2		1	P			1			3		2			
	D									1			3					
Morocco	C	3	1	15									4		1			
	D	4		2														
Nigeria: Lagos	C	5	1	7	1	1	3	1		3		2	33	1	2	2		
	D	5	1	7	1	1	3	1		3		2		1	2	2		

Nigeria: Lagos	C	5	1	7	1	1	3	1		3		2	33	1	2	2		
	D	5	1	7	1	1	3	1		3		2		1	2	2		
Plague-infected rats		11	18	8		4	2	4				11	3					
Senegal (see table below).																		
Siam	C			7	3								3	1	1			
	D			6	2								3	1				
Bangkok	C			3														
	D			2														
Nagara Rajsima	C			2		1						1				1		
	D			2		1						1				1		
Syria: Beirut	C	12	9	2	3	2							1		3	1		
Tripolitania	C			2													4	
Tunisia:																		
Sfax district	C	9	6	1														
Tunis	C	1	5											1		1		
	D	1	1															
Union of Socialist Soviet Republics:																		
Salsk Region	C	2	5	7														
	D	1	4	5														
Stavropol Region	C	1																
	D	1																
Union of South Africa:																		
Cape Province	C	1	1	1				1					1					
	D		1	1			1											
Orange Free State	C				1		1											
	D				1		1											

Place		May, 1930	June, 1930	July, 1930	Aug., 1930	Sept., 1930	Oct., 1930
British East Africa (see also table above):							
Kenya	C	171	107	97	87	53	50
Ecuador: Guayaquil	C	0	0				
	D	0	0				
Plague-infected rats		0	0				
Greece (see also table above)	C		1				
Indo-China (see also table above)	C		11	1	2	4	
Madagascar (see also table above):							
Ambositra Province	C	1					
	D	1					
Antisirabe Province	C	19	3	24	11	21	
	D	19	3	24	11	21	
Miarinarivo Province	C	5	1	1	2	7	
	D	5	1	1	2	7	
Moramanga Province	C	1	3		27	18	
	D		3		27	17	

Place		May, 1930	June, 1930	July, 1930	Aug., 1930	Sept., 1930	Oct., 1930
Madagascar (see also table above)—Con.							
Tananarive Province	C	15	16	28	39	79	
	D	14	16	28	38	79	
Senegal:							
Baol [1]	C	13	2	62	79	48	53
	D	11	2	48	20	23	35
Dakar [1]	C	52	53	140	108	3	
	D	42	117	122	90	8	
Louga [1]	C	54	60	138	75	61	37
	D	27	21	103	33	30	25
Thies [1]	C	21	52	54	34	12	24
	D	8	35	30	20	4	15
Tivaouane [1]	C	135	43	119	110	20	53
	D	69	28	70	54	14	31

[1] Incomplete reports.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		June 1–28, 1930	June 29–July 26, 1930	July 27–Aug. 23, 1930	Week ended— Aug. 30, 1930	Sept. 6	Sept. 13	Sept. 20	Sept. 27	Oct. 4	Oct. 11	Oct. 18	Oct. 25	Nov. 1	Nov. 8	Nov. 15	Nov. 22	Nov. 29
Algeria:																		
Algiers	C		1	8														
Constantine	C	1	1												1			
Arabia: Aden	C		1															
Brazil: Rio de Janeiro	C														2			
British East Africa (see also table below):																		
Tanganyika	C	1,610	168	242	198	288		36	27	43	4	21	3					
	D	301	42	37	4	55		1	1		1	4	1					
British South Africa: Southern Rhodesia	C	79	31	1	1				14	39	98	2	2					
Canada:																		
Alberta	C		5	1				1		13	8	1					1	
British Columbia—Vancouver	C	2	6	6			1	1	1			1		3				
Manitoba	C	4			1													
Ontario	C	47	24	20	2	2	6		1		3	15		20	9		7	12
Ottawa	C	15	13	7	2	1	2						14		9	14		8
Toronto	C	4	1				1											2
Quebec	C	4	3	5													1	
Montreal	C			7														
Saskatchewan	C	22	5	8			1			3				2			2	
China:																		
Changking	C	1	P	P	P	P	P	P	P	P	P	P	P	P				
Foochow	C	P	P	P		P		P		P								
Hong Kong	C	4	2															
	D	3	1															
Manchuria—																		
Harbin	C	4	3	2														
Kwantung—Dairen	C	16	8														1	
	D	1																
Nanking	C	P	P	P	P	P	P	P	P	P	P	P	P	P				
Shanghai—																		
Foreigners only	C	5	4	3			18					1	1		1			
Including natives	D	3					2									1		
Swatow	D	4	1	4	1	1			1			3	1	1		1		
Tientsin	C								1									

Chosen (see table below).																		
Colombia:																		
Barranquilla	C			2														
Buenaventura	C	6	10	2						1		1						
Cali	D																	
Costa Rica: Port Limon	C	2																
Curacao (alastrim)	C	1	2	1														
Dutch East Indies:																		
Borneo	C	12	2															
	D	1																
Java—																		
Batavia and West Java	C	13	8	12	2	5	2	2	10	2	1	1	2					
	D	3	5	5	2		1	1	1	1	1	1	2					
East Java and Madura	C		1															
Sanggi Islands	C		11	36	14													
	D		3	2	3													
Egypt: Port Said	C		3															
France (see table below).																		
Great Britain:																		
England and Wales	C	926	529	344	99	106	75	61	82	74	44	125	86	87	92	107		
Ashton under Lyne	C	7	8															
Bradford	C		1							1	1	1	1	1				
Cardiff	C		2										1					
Leeds	C		1													2		
London	C	498	250	178	43	44	36	41	30	34	23	33	29	32	41	47		
London and Great Towns	C	753	408	285	79	84	51	54	55	56	32	80	52	58	68	52		
	D										1			1				
Stoke-on-Trent	C	32	9	2			1	1			1			1				
Scotland	C	4	1			5												
	D		1															
Honduras: Naco	C						5											
India	C	12,962	7,630	4,877	830	940	610	751	611	528								
	D	3,531	2,348	1,246	202	209	119	150	202	122								
Bombay	C	113	50	12	2	1	1	2			1							
	D	79	33	10	2	1	2											
Calcutta	C	161	73	25	4	5	3	2	3	4	3	2	2	4	3		3	
	D	146	56	21	3	4	1	1	3	4	3	1	2	2	3		3	
Cochin	C	16	6	14	1	1		1			8	4	3	5	10	7	4	
	D	4			1						1		1			2	2	
Karachi	C	7	1	4			1	3									2	
	D	3		3				2										
Madras	C	35	49	38	9	11	6	8	4	4	8	3	2	1	2	4	3	
	D	10	12	11	1	1	1	3	1	2	3	2			2			
Moulmein	C	21	18	2	1													
	D	7	1	1			1											
Negapatam	C	2	4	4	1	2		6	4	2	5	3	2	2	2	3	3	
Rangoon	C	9		3								2			5			
	D	2																
Tuticorin	C	1										1						
Vizagapatam	C	1									1							

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		June 1–28, 1930	June 29–July 26, 1930	July 27–Aug. 23, 1930	Week ended—												
					Aug. 30, 1930	September, 1930				October, 1930				November, 1930				
						6	13	20	27	4	11	18	25	1	8	15	22	29
India (French):																		
Chandernagor	C	19	4				1	2			3			3				
	D	3	3			1	1				1			1				
Karikal	C	11	2	9		5			1									
	D	8	2	9		2			1									
Pondicherry Province	C	23	26	22	11	7	7	10	11	10	6	11	1	2				
	D	23	25	22	11	7	7	8	11	8	6	11	1	2				
India (Portuguese)	C	28	1	9	1	2		1										
	D	10	1	2														
Indo-China (see also table below):																		
Pnompenh	C		1								2							
	D	1	1	1														
Saigon and Cholon	C	1		1	1									2			2	
	D			3	1									2			1	
Iraq:																		
Baghdad	C	1	3	1				1		2								
	D		1	1														
Mossoul Liwa	C	4	67						63		4	2			6		7	9
	D	1	20						27								1	1
Ivory Coast (see table below).																		
Mexico (see also table below):																		
Jalisco (State) Guadalajara	D	15	4	1						2		1	1		1	1	1	
Juarez	C	6		2														
	D	1		1					1				1					
Mexico City and surrounding territory	C	77	37	10	7	2	1	2	1	3	5	4	1	3				
	D	17	8	6	1	1	1	2			1	2	1					
Progreso	D	1																
Vera Cruz	C													1				
Morocco (see table below).																		
Nigeria: Lagos	C	1																
Poland	C	2												3				
Portugal:																		
Lisbon	C	10	13	30	7	8		12	4	5		7	12			8	11	
Oporto	C			1														

Siam	C		6							1									
	D		3																
Somaliland, British: Boales	C									1					1				
	D									1									
Spain	C	12	5	2		4	1						14	5	11				
Straits Settlements	C	9	11	8	1	2	2	1	1	1	1	2	3	3	4		3		
	D	2	3	3		1					1			1	1		1		
Sudan (Anglo-Egyptian)	C	67	12	42	102	5	20	1	25	1	56		3			2			3
	D	3	1	3	50	2			2		5					1			
Sudan (French) (see table below).																			
Switzerland: Berne Canton	C		1	2					1										
Syria (see table below).																			
Tunisia: Tunis	C	2	1					2											
Turkey (see table below).																			
Union of South Africa:																			
Cape Province	C		P			P	P	P			P	P	P						
Orange Free State	C		P	P										1					
Transvaal	C			P	P	P	P	P	P		P	P	P						
Upper Volta	C	13																	
On vessel: S. S. Manoa, from Honolulu to San Francisco	C		1																

Place		May, 1930	June, 1930	July, 1930	August, 1930			September, 1930			October, 1930		
					1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31
Indo-China (see also table above)	C	305	213	238	59	34		54	52	56	32	62	164
Ivory Coast	C												4
Sudan (French)	C	274	76	34			39		P			17	
	D	32	18				3					2	
Syria: Beirut	C	7	7	2	1								

Place		May, 1930	June, 1930	July, 1930	Aug., 1930	Sept., 1930	Oct., 1930
British East Africa (see also table above):							
Kenya	C	171	142	186		424	
Uganda	C	78					
	D	69					
Chosen	C	107		3	2		
	D	35					
Seishin	C	2	1	2			
	D	1					

Place		May, 1930	June, 1930	July, 1930	Aug., 1930	Sept., 1930	Oct., 1930
France	C	51		1			
Mexico: Durango (see also table above)	D	4	3	3	3	2	
Morocco	C	18	5	3	8	1	4
Turkey	C	16					

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		May 4–31, 1930	June 1–28, 1930	June 29–July 26, 1930	July 27–Aug. 23, 1930	Week ended— Aug. 30, 1930	September, 1930				October, 1930				November, 1930			
							6	13	20	27	4	11	18	25	1	8	15	22
Algeria:																		
Algiers	C	15	3	6	2		3									1		
Constantine Department	C	6	12	2	3						2			1				
Oran	C	3	4	3	1	1						1	2					
Bolivia: La Paz.[1]																		
Bulgaria	C	6	16	10	1		2	2		2		1	3			1	2	
	D	2	1	1														
China:																		
Manchuria—Harbin (see also table below)	C	13	8	2	2	2							1					
Shanghai	C				1													
Chosen (see table below).																		
Czechoslovakia (see table below).																		
Egypt:																		
Alexandria	C		1	1	1		1	1	1	1							2	
Beheira Province	C	49	45	15					1									
	D	13	4	2														
Cairo	C				7			1										
Port Said	C				4		1				1			1				
Great Britain: Scotland—																		
Dunfermline	C			1														
Glasgow	C	1																
	D	1																
Greece (see table below).																		
Ireland:																		
Irish Free State—																		
Galway County—Oughterard	C			2														
Leitrim County—Mohill	C		9	1														
Mayo County—																		
Ballina	C	2	1	1														
Castlebar	C				1													
Swinford	C	14																
Westport	C			2	1													
Roscommon County—																		
Roscommon	C			1														
Strokestown	C			1														
Wicklow County—Shillelagh	C		4	2														

Latvia (see table below).																		
Lithuania (see table below).																		
Mexico:																		
Durango	D								1	1		1						
Mexico City, including municipalities in Federal District	C	6	9	5	9	2	2	3				3	5	1	1			
	D	3	1		2		1	1				2		1				
Morocco	C	11	15	11	8		2							1		1	1	
	D												1					
Palestine	C	2	2	6	3		1	1	1		1	1	1			2	1	1
Poland	C	171	117	36	34	2	3	6	12	3	6	6	7	7	8	15	7	
	D	5	11	4	3		1			1			1					
Portugal: Oporto	C				1													
Rumania	C	227	58	28	9	1		1	2	3	4		6					
	D	35	5	8	2													
Spain	C		3	3				1				1	1			4		
	D			1				1				1	1					
Tunisia	C	6	18	24	10	1	1		4	1	1	1	9					
Turkey (see table below).																		
Union of South Africa:																		
Cape Province	C	P	P	P	P	P	P	P	P	P	P	P	P	P				
Muncipality of East London	C			1					2			1						
Natal	C	P	P	1	P			P			P	P	2	P				
Orange Free State	C	P	P	P	P	P	P	P	P									
Transvaal	C			P	P	P	P	P	P	P	P	P	P	P				
Yugoslavia (see table below).																		

Place		May, 1930	June, 1930	July, 1930	Aug., 1930	Sept., 1930	Oct., 1930
China: Harbin (see also table above)	C	240		14	5		
Chosen: Seoul	C	43	2	3	2	1	
Czechoslovakia	C	12	1		1		
Greece: Athens	C	3	3	6	6	4	2
Latvia	C	3	3	3	1	2	

Place		May, 1930	June, 1930	July, 1930	Aug., 1930	Sept., 1930	Oct., 1930
Lithuania	C	27	16	18	7	24	1
	D				1	2	
Turkey	C	16	2	7	2		
Yugoslavia	C	16	6				
	D	1					

[1] 12 deaths from typhus fever were reported in La Paz, Bolivia, from Jan. 1 to May 31, 1930.

YELLOW FEVER

Brazil:	Cases
Campos, Rio de Janeiro Province, May 23, 1930	1
Para, June 23, 1930	2

Gold coast:	Cases
July 10, 1930	1
Albosso, Aug. 5, 1930 (deaths)	1
Liberia, Monrovia, June 3, 1930	1
Nigeria, Lagos, July 12, 1930 (probably laboratory infection)	1